

AAI AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

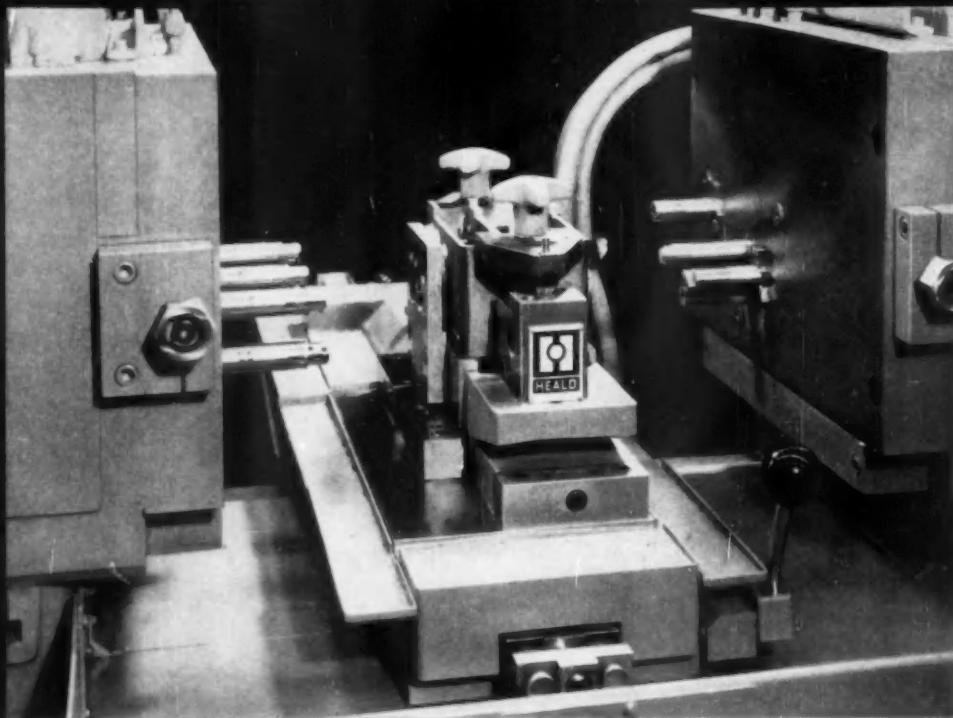
OCTOBER 15, 1957

In This Issue

Special Handling Setup for Chassis Frame Assembly
Mechanical Features of Chrysler Corp. Cars for '58
Automatic Production of Tapered Roller Bearing Cups
American Motor's 1958 Ramblers and Ambassadors
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Chevrolet's New Truck Line Comprising 128 Models

COMPLETE TABLE OF CONTENTS, PAGE 3

A C H I L T O N P U B L I C A T I O N



HOW TO BORIZE MULTIPLE HOLES ON CLOSE CENTERS in one fully-automatic cycle!

New Multi-Spindle Boringheads make it as easy as A, B, C

PRECISION boring of closely-spaced multiple holes used to be a slow and laborious job — done one-at-a-time on large, costly equipment that required highly-skilled operators. But not any more!

The new Heald Multi-Spindle Boringheads put high-precision, close-center borizing on a mass-production basis. Used with any Heald Bore-Matic, this Multi-Spindle head will precision Borize any practical number of holes, on centers as close as $\frac{3}{4}$ ", at a single pass of the table — and duplicate the same operation again and again.

A Multi-Spindle head unit consists of a supporting frame which mounts interchangeable spindle plates, precision bored to receive the required number and arrangement of miniature precision Red-Head boringheads.

Any or all boringheads, including the smallest size, $\frac{3}{4}$ ", can be provided with hydraulic cross-feed units operated from a single cylinder. Job changeover is simply a matter of switching spindle plates, and mounting the miniature boringheads required.

For the complete story on this important new development, send for Bulletin 2-021-022-1 Issue 1.

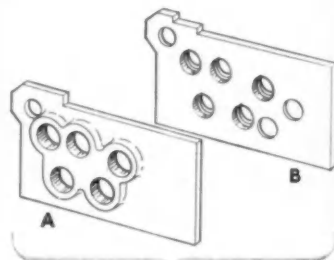
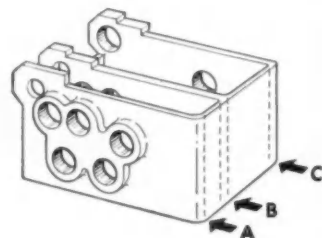
IT PAYS TO COME TO HEALD

THE HEALD MACHINE COMPANY

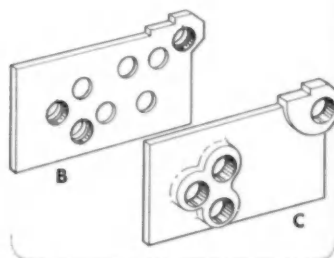
Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



Holes Borized on Left End



Holes Borized on Right End

HERE'S A GOOD EXAMPLE:

The Model 122 Bore-Matic shown above is equipped with Multi-Spindle Boringheads on both ends, to precision finish close-center bores in a small transmission housing. Each head consists of a group of miniature, precision Red-Head boringheads mounted on spindle plates that are jig bored for precise location of each Red Head. The setup shown, with 5 heads on the left and 4 on the right, is designed to bore and face 17 different holes. All operations are performed in a single, fully automatic cycle, with just one chucking of the work, and no indexing. The surfaces finished at each end of the machine are shown in the "exploded" part drawings above.



OVER THE ROAD...

or
**OFF THE
HIGHWAY**

- fast
- smooth
- powerful

TURBO-SUPERCHARGED DIESELS

MODEL	Cyl.	*Features	Bore and Stroke	Displ. Cu. In.	Max. Torque @ RPM	Max. HP	RPM
197-DLCS	6	ATV	4 x4	302	275-1800	131	2800
135-DKBS	6	ACTV	4 1/4 x5	426	400-1800	185	2800
148-DKBS	6	ACTV	5 1/4 x6	779	706-1800	280	2100
WAKDBS	6	ACTV	6 1/4 x6 1/2	1197	1062-1600	352	1800

NORMAL DIESELS

180-DLC	4	AC	3 1/2 x3 3/4	144	102-1800	45	2400
185-DLC	6	A	3 1/2 x3 3/4	216	152-1000	60	2400
190-DLCA	6	AC	3 3/4 x4	265	191-1400	84	2800
195-DLCA	6	AC	4 x4	302	221-1800	98	2800
197-DLC	6	AV	4 x4	302	216-1600	91	2800
135-DKB	6	ACV	4 1/4 x5	426	328-1600	147	2800
148-DKB	6	ACV	5 1/4 x6	779	584-1000	200	2100
WAKDB	6	ACV	6 1/4 x6 1/2	1197	845-1000	258	1800

GASOLINE

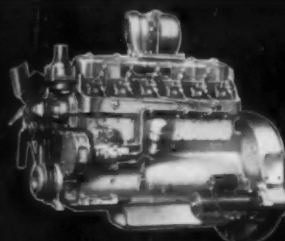
180-GLB	4	AC	3 1/2 x3 3/4	144	118-1600	45	2400
185-GLB	6	A	3 1/2 x3 3/4	216	176-1400	67	2400
190-GLB	6	A	3 3/4 x4	265	223-1200	77	2400
195-GKA	6	ACV	4 1/4 x4	320	244-1400	122	3000†
MZA	6	A	4 1/4 x4 3/4	404	289-1000	128	2800†
135-GKB	6	ACV	4 1/4 x5	426	337-1200	147	2800†
135-GZB	6	ACV	4 3/8 x5	451	354-1200	153	2800†
140-GKB	6	ACV	4 1/2 x5 1/2	525	426-800	177	2600†
140-GZB	6	ACV	4 3/8 x5 1/2	554	453-800	188	2600†
145-GKB	6	ACV	5 1/4 x6	779	594-1000	240	2400†
145-GZB	6	ACV	5 3/8 x6	817	652-1200	260	2400†
WAKB	6	ACV	6 1/4 x6 1/2	1197	997-1000	280	1800

*FEATURES: A—Aluminum Alloy Pistons; C—Counterbalanced Crankshaft; T—Turbo-Supercharged; V—Vibration Damper.

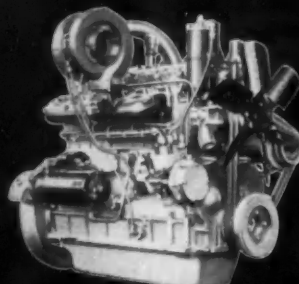
†These engines rated at higher hp and rpm for fire engine service. Send for Bulletin 1079 for LPG ratings and complete listing of engine hp and speed ratings.

WAUKESHA ENGINES

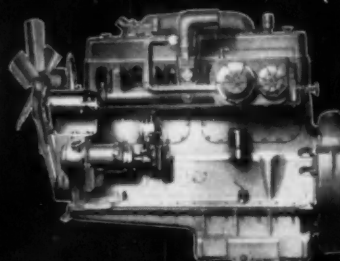
**NORMAL and TURBOCHARGED DIESELS
...GASOLINE...LP GAS
Standard or Counterbalanced Crankshafts**



197-DLCS—Turbocharged Diesel
(Also normally aspirated)



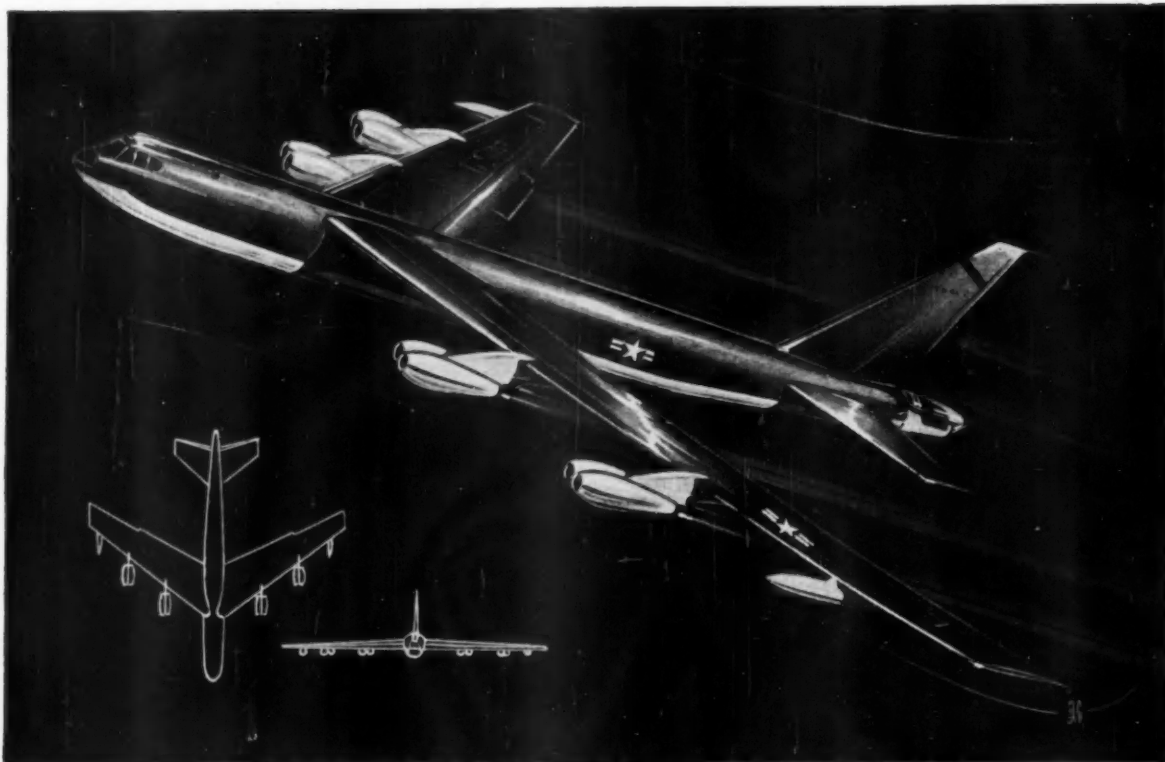
135-DKBS—Turbocharged Diesel
(Also normally aspirated)



WAKB—Equipped for butane



Write for descriptive bulletins
WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin
New York • Tulsa • Los Angeles



B-52 Stratofortress — This global bomber is powered by eight J-57 turbo-jet engines, paired in sharply-raked forward pods. Her service ceiling is above 50,000 feet.

Designer stuffs a gasket so B-52 can flex its wings

The Inco Nickel Alloy that gives gaskets for hot gas ducts in the B-52 their "give" may prove useful to you.

Imagine a gasket that stays lively during repeated flexing at temperatures up to 600°F.

What material would you use?

Designers of the B-52 did it with Inconel® nickel-chromium-iron alloy knitted mesh stuffed into a hollow ring.

It's the "give" in this wire mesh and tube retainer that helps the gas-

ket maintain its perfect seal.

What gives the retainer its "give" at high temperatures?

Inconel alloy's outstanding resistance to relaxation in the 500° to 700°F. range which is why Inconel alloy is used for high temperature springs. This Inco Nickel Alloy also provides a combination of other useful properties: good strength, ductility and resistance to oxidation at high temperatures.

Where should you use special alloys?

Have a chat with Inco's Mechanical Engineering Section. Their wide experience in the application and performance of Inco Nickel Alloys may prove helpful in finding alloys to meet metal problems in many different areas. As a starter — outline your problem and send it to:

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.



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are marketed under the following trademarks:
MONEL • "R" MONEL • "K" MONEL • "KR" MONEL
"S" MONEL • INCONEL • INCONEL "X" • INCONEL
"W" • INCONEL "700" • INCOLOY • INCOLOY "T"
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Where Inco Nickel Alloys are used in jet aircraft

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Combustion liners
Transition sections
Insulating blankets
Lock wire and rivets
Fuel line tubing

Incoloy "T"

Transition sections
Combustion liners

Incoloy "901"

Turbine discs

Inconel "X"

Rotor discs
Afterburner bellows
High-temperature bolts
Rocket engine rotors

Monel

Lock wire
Fine fuel line
tubing
Rivets

Nimonic Alloys

Combustion liners
Transition sections
Vaporizer tubes
Turbine blades
Rotor discs

"S" Monel

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rings

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Inconel "W"

Tail cones
Afterburners

Inconel "700"

Turbine blades

Pure Nickel for electrical and electronic gear. Primary Nickel as alloying element in other materials. Inco

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

OCTOBER 15, 1957

VOL. 117, NO. 8

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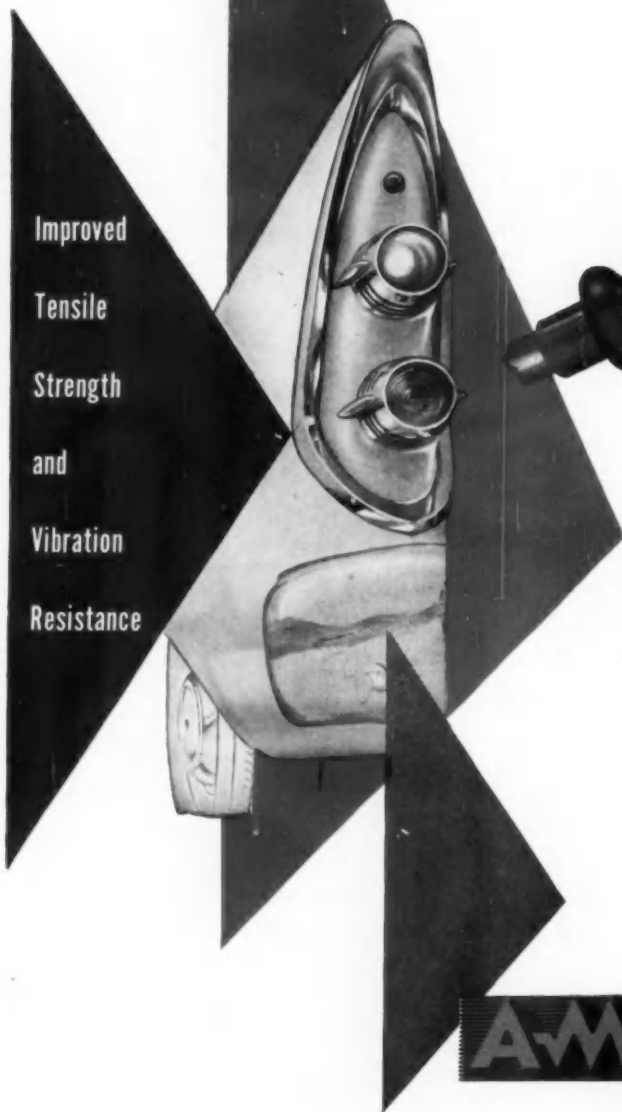
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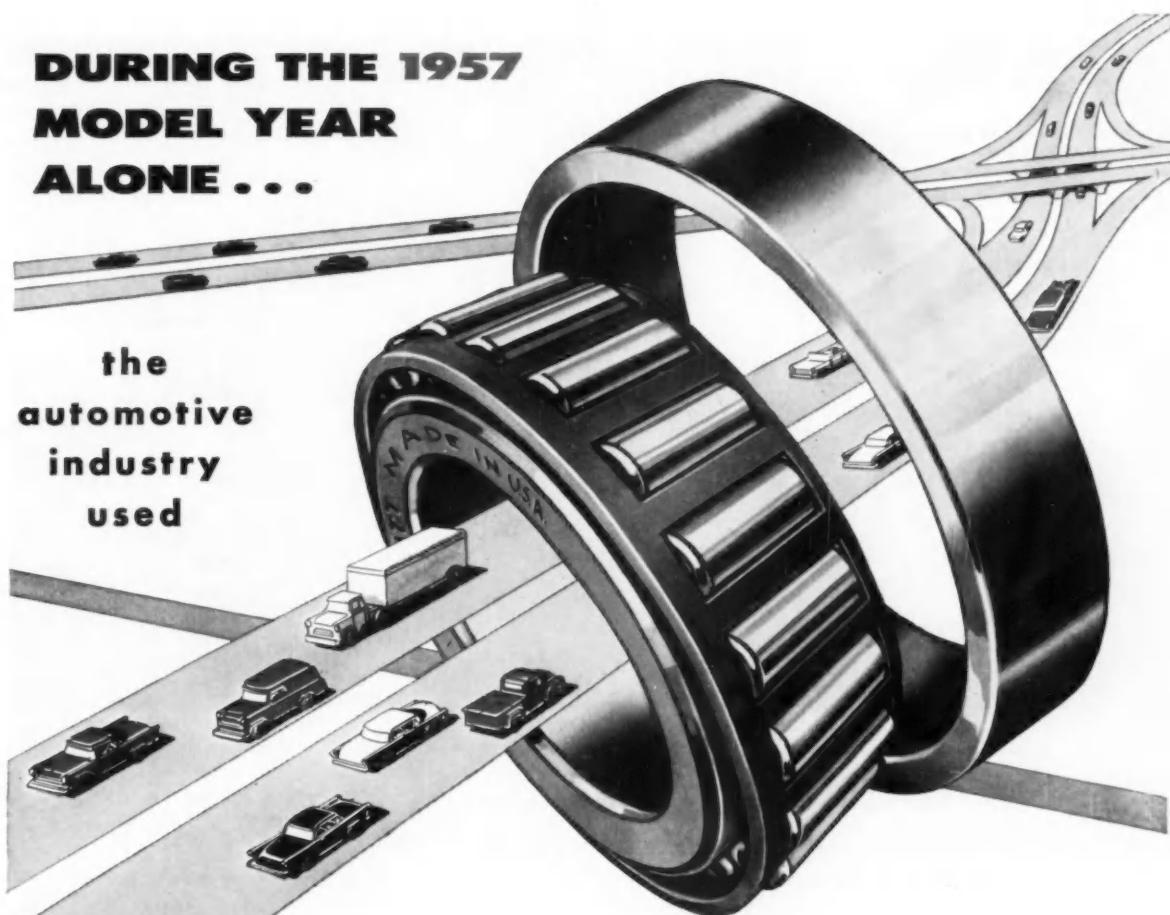
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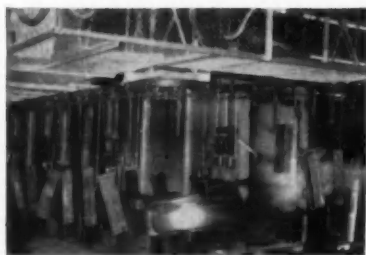


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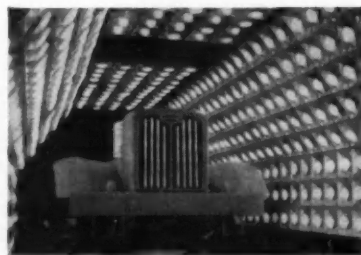
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HARD, DURABLE FINISHES, bonded with ACP Duridine, protect the metal in Autocar trucks. Uniformly controlled infrared baking of paint is done while the truck moves along the chassis line.

As simple as alkali cleaning, but much more effective, ACP Duridine cleans and phosphate coats steel in a single operation. It carries off harmful surface dirt, oil and grease. It develops a thin, tight, close-grained nonmetallic phosphate coating which inhibits corrosion and forms an excellent bond for the paint finish. It is applied in 1 to 3 minutes in a 4-stage power spray washer.



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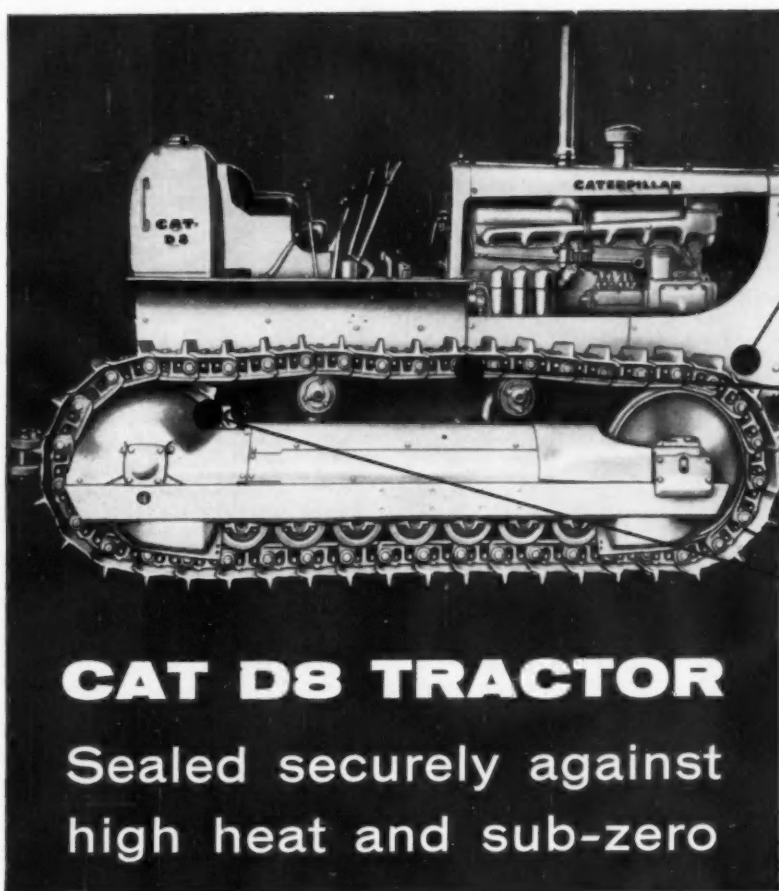
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New Engineering Catalog No. 305 Sent on Request

You'll find much useful data in this 60-page manual on modern oil seal specification procedure. Get a copy from your Victor Field Engineer or write directly to Victor.

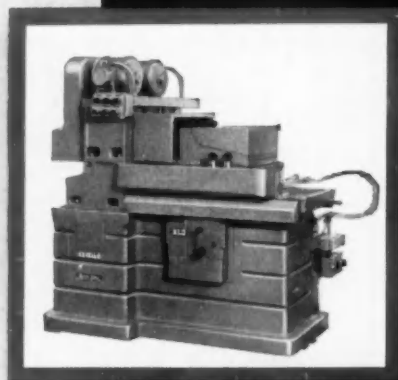
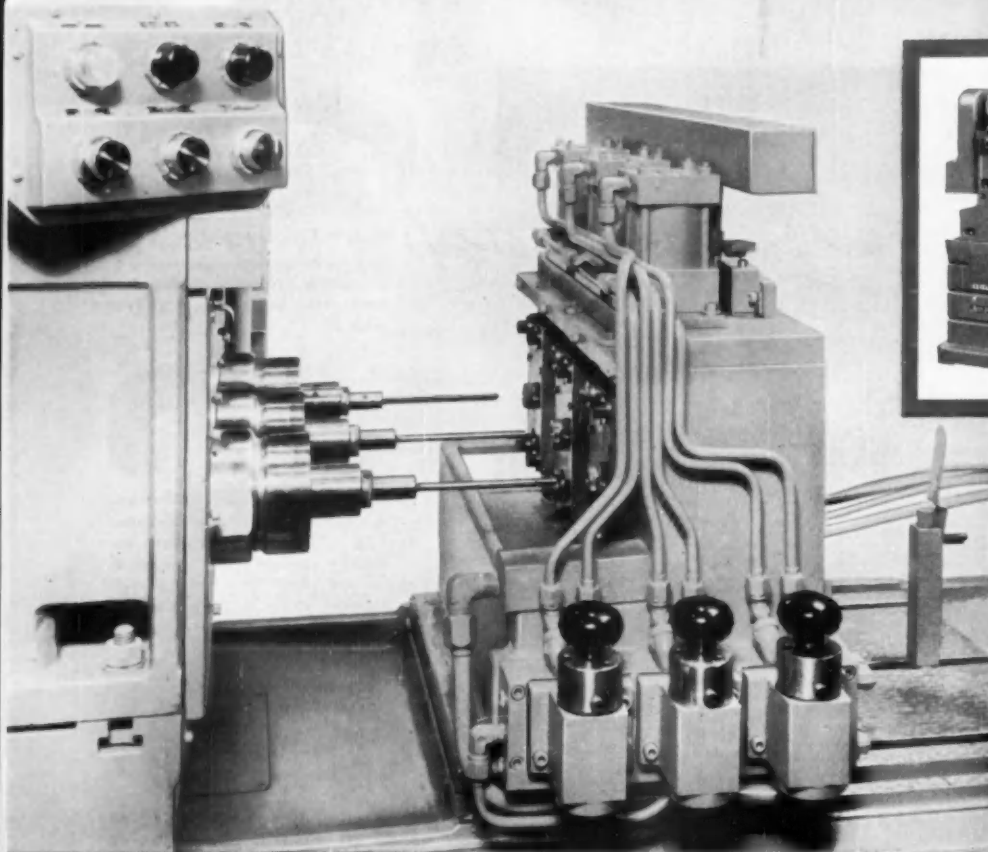


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THE SOLUTION: Ex-Cell-O Style 112-D Precision Boring Machines equipped for Bor-Drilling. These machines are Bor-Drilling .312"-.313" diameter through holes for a distance of 2½", three at a time in transmission range selector shaft.

WHAT IS BOR-DRILLING? Bor-Drill is a new way of driving gun drills, adapted to high production-with-accuracy requirements. Bor-Drilling is especially effective when machining from the solid holes too long for single-tool boring applications, and holes in which it is difficult to maintain finish size. Bor-Drilling requires no secondary finishing operations in most cases. Ask your Ex-Cell-O Representative or write Ex-Cell-O, Detroit for Bulletin 311162 explaining all about Bor-Drilling.

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CORPORATION
DETROIT 32, MICHIGAN

Machinery Division

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Bor-Drilling turns out straight, accurate holes—such as these held to .312"-.313" diameter for 2½ inches.

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Here's Why -

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3. **Facilities:** Muskegon is ready now, with the world's largest piston ring foundry and modern machine equipment to produce all your production piston rings and ready-packaged service sets, with your own label.

Muskegon offers you knowledge, skill and facilities to help make your engines for '58 and '59 the finest ever. Muskegon Piston Ring Co., Muskegon, Michigan.



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Top Chrome
Compression Rings

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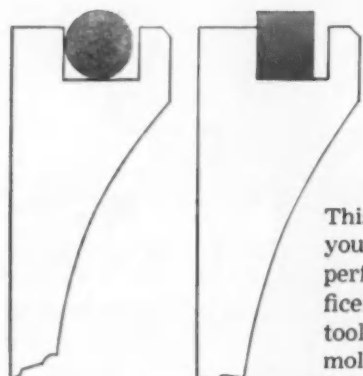
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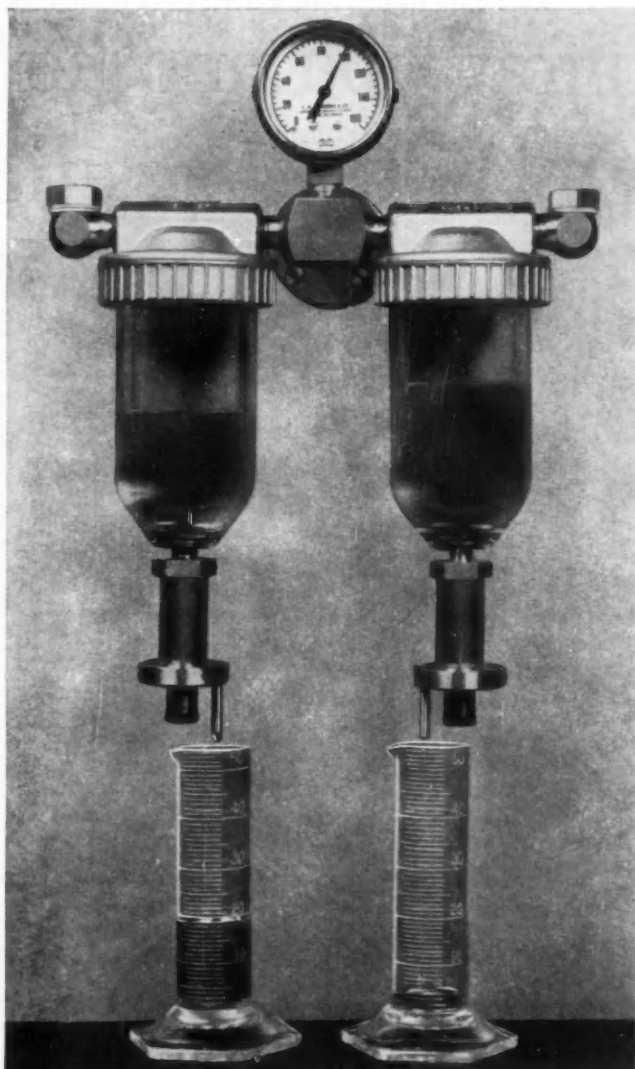
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ANTILEAK DEMONSTRATION

Suntac oil in one chamber, your present hydraulic oil of the same viscosity in the other. Both oils are forced out through sintered bronze bearings. In this photograph, pressure of 100 psi caused a straight mineral oil to leak out four times faster than Suntac.



INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

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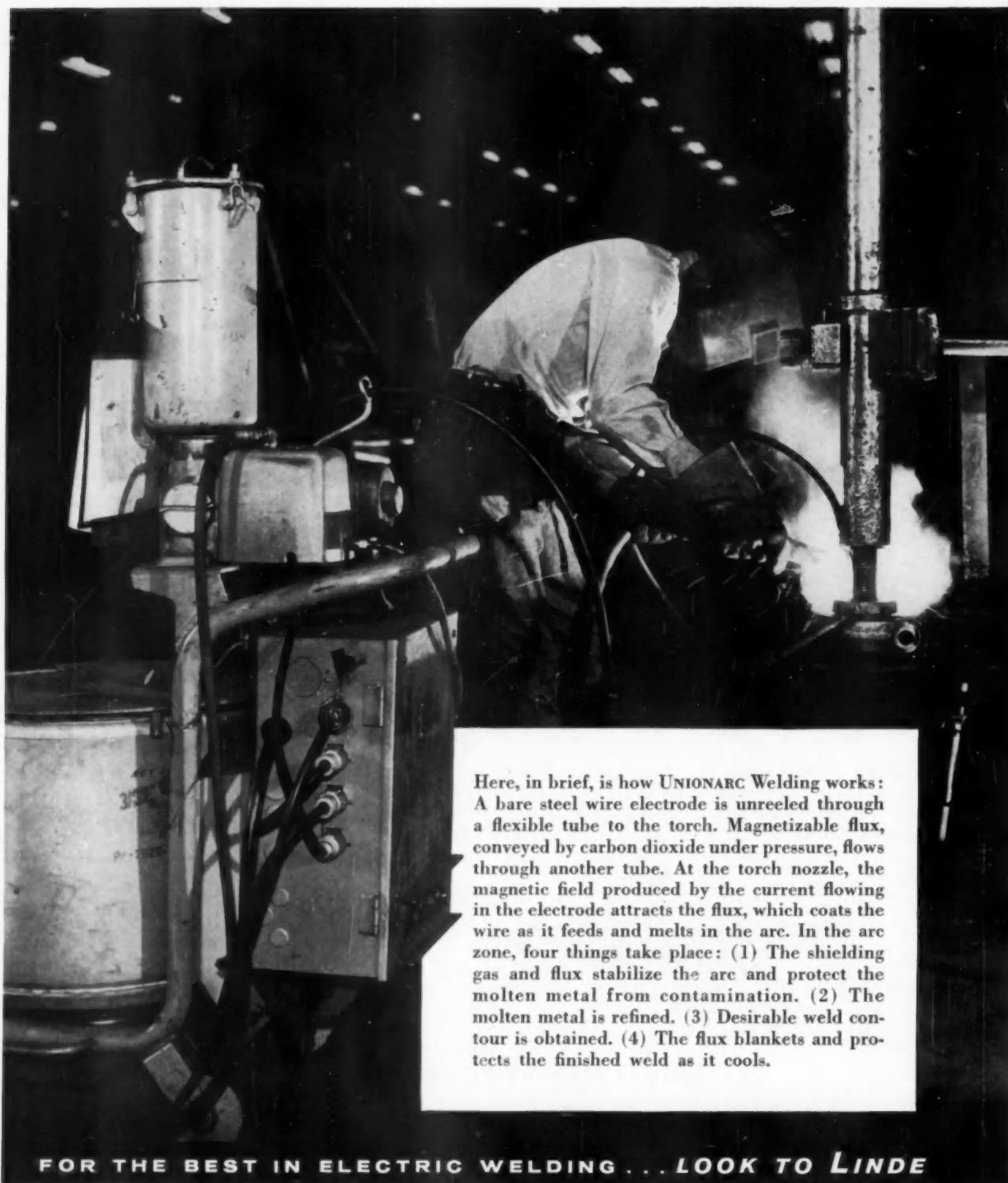
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Match Suntac against the hydraulic oil you're now using—see how the exceptional non-gummy antileak characteristics of Suntac can reduce your oil losses as much as 75%. *Some users have even reported savings of 90%.*

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Now... LINDE offers you another UNIONARC Magnetic



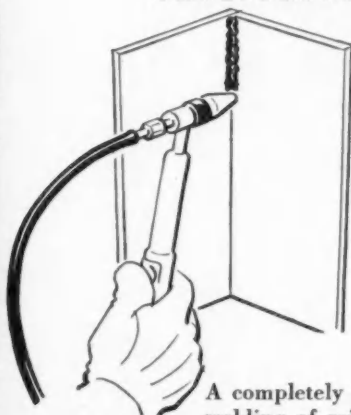
Here, in brief, is how UNIONARC Welding works: A bare steel wire electrode is unreeled through a flexible tube to the torch. Magnetizable flux, conveyed by carbon dioxide under pressure, flows through another tube. At the torch nozzle, the magnetic field produced by the current flowing in the electrode attracts the flux, which coats the wire as it feeds and melts in the arc. In the arc zone, four things take place: (1) The shielding gas and flux stabilize the arc and protect the molten metal from contamination. (2) The molten metal is refined. (3) Desirable weld contour is obtained. (4) The flux blankets and protects the finished weld as it cools.

FOR THE BEST IN ELECTRIC WELDING . . . LOOK TO LINDE

modern welding method— Flux Gas Shielded Arc Welding

*UNIONARC is an entirely new method of
welding steel in all manual positions...*

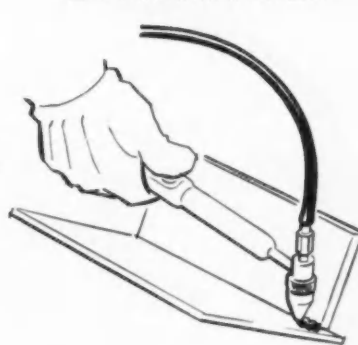
VERTICAL



OVERHEAD



DOWNHAND



A completely new concept for manual welding of mild steel has been developed by LINDE. Called UNIONARC Welding, the method uses a continuously-fed bare steel wire electrode, which is magnetically coated with flux and shielded by carbon dioxide. The torch can be easily handled in all welding positions—vertical, overhead, downhand. Manual welds can be made at higher speeds and at lower cost than with covered electrodes. UNIONARC Welding produces high-quality welds in steel, even when moderate amounts of rust, scale, and moisture are present.

Among the numerous advantages of UNIONARC Welding are these: Rate of operation is up to three times faster than with covered electrodes. There is no stopping to renew electrodes, since a single loading of wire can be fed smoothly and continuously for periods up to a week. Manual skill needed is no more than that required with covered electrodes. In vertical and overhead positions, the deposition rate in UNIONARC Welding is two to three times greater than with covered electrode methods; in downhand positions, up to twice as great. There is practically no spatter—

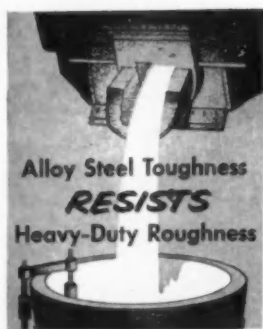
the little that appears is easily brushed away, leaving a clean, smooth weld.

LINDE has made many notable contributions to welding. Among these are the introduction and development of submerged arc welding (UNIONMELT Welding), non-consumable electrode, inert gas shielded arc welding (HELIARC Welding), and the development of Sigma (shielded inert gas metal arc) welding. LINDE's newest method, UNIONARC Welding, is another first—a truly important contribution. Its simplicity and versatility make it unique. Its efficiency and economy have been proved in actual production work. Write now for details about UNIONARC Welding, or call the LINDE office nearest you.

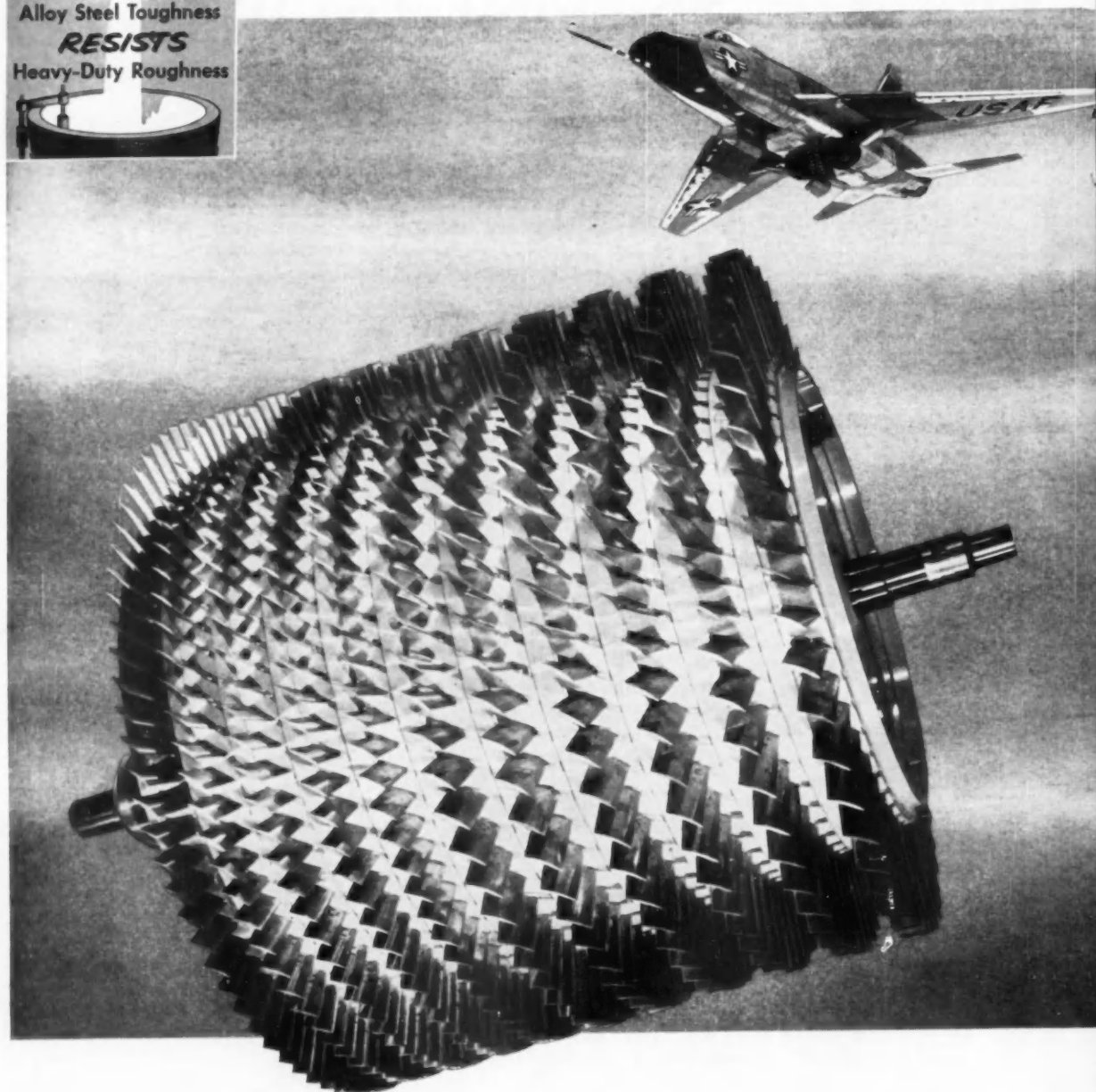
LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.

The terms "LINDE," "HELIARC,"
"UNIONMELT," "UNIONARC,"
and "UNION CARBIDE" are
trade marks of Union Carbide Corporation.





ALLOY STEEL PROVIDES HIGH



REPUBLIC



World's Widest Range of Standard Steels

STRENGTH...DEPENDABLE TOUGHNESS

in Jet Engine Compressor Rotor Discs

Design the part to do the job safely—but keep weight down. Increase the ratio of horsepower to weight. Provide maximum resistance to fatigue. Maintain the strength of the part at wide temperature extremes. Whenever these design problems occur, alloy steels, such as Republic Hot Rolled AMS 6415 (AISI 4340), are given immediate consideration.

For in these fine steels are found the highest strength values—plus an exceptionally high strength-to-weight ratio that permits the design of thinner, lighter sections to save weight and hold down size without sacrifice of strength or safety.

These essential qualities of AMS 6415 were the basis for its selection for use in compressor rotor discs in Pratt & Whitney Aircraft's J-57 jet engine. The discs are machined from forgings by the Jet Division of Thompson Products, Inc. Forgings are supplied by Wyman-Gordon Company.

Still another reason for selection of this fine steel is its exceptionally good deep-hardening characteristics. Uniform response to heat treatment is assured—plus the production of hard, wear-resistant surfaces around tough cores.

Production, processing and development of aircraft alloy steels requires extremely close cooperation among the metallurgists of the part manufacturer, forge plant, and steel producer. The culmination of their combined effort provides the designer with a material for operating and structural parts that is free from excess weight, yet tough and strong to withstand shock, impact, stress and fatigue.

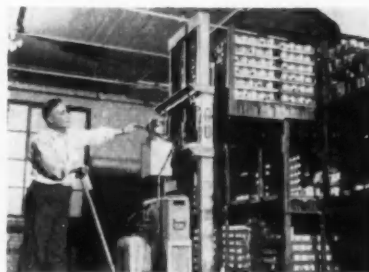
Republic metallurgists are always available to work with your personnel in applying these fine alloy steels to your product. The coupon is your invitation to use this confidential and obligation-free service. Mail it today.



TOUGHNESS TO WITHSTAND CORROSION, WEAR AND ABRASION make Republic Cold Finished ENDURO Stainless Steel Bars ideal for this sea-plane hull testing device at Convair. Tests are conducted by suspending hull models from carriage which rolls on Republic Stainless Steel Bars. High tensile strength, close tolerance and a fine surface finish permit smooth, accurate operation of the testing device. Send coupon for more facts on Cold Finished ENDURO Bars.



TOUGH, BONDERIZED STEEL BASE provides the enameled finish of Republic Steel Lockers with protection from damage due to bumps, scratches, moisture. Bonderizing guards against the spreading of under-finish corrosion that causes flaking and peeling. Give employee morale a boost with handsome Republic industrial lockers. Three locking systems available. Our locker specialists offer complete planning and installation service. Mail coupon for illustrated booklet on types, specifications and prices.



TOUGH, STRONG REPUBLIC STEEL STACKING SKIDS speed piston handling at Thompson Products, Inc. Looking for a way to streamline handling operations and cut costs, Thompson contacted Republic. Joint effort of both companies' engineers produced the design of the PR-15 Stacking Skid, which was then fabricated by Republic's Pressed Steel Division. The result; Thompson enjoys faster, more economical handling in less space and with less equipment. Write for complete details.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION

DEPT. C-4331

3106 EAST 45th STREET • CLEVELAND 27, OHIO

☐ Have an Alloy Metallurgist call.

Send more information on:

☐ Alloy Steels ☐ Cold Finished ENDURO® Bars

☐ Bonderized Steel Lockers ☐ PR-15 Stacking Skids

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____



DESIGNED FOR HEAVY DUTY, HIGH PRODUCTION SERVICE, the Norton 6" x 8" Semiautomatic Piston Grinder produces standard automotive and other types of pistons. Its high speed, accuracy and economical operation add the "Touch of Gold" that produces more pistons and lowers your costs.

Here's why you can grind pistons better

for less
money

with the Norton 6" x 8" semiautomatic piston grinding machine

Fast automatic sizing is just one important advantage of the Norton 6" x 8" Piston Grinder. This is assured by the repetitive accuracy of the easily adjustable "micrometric-type" revolving screw wheel feed mechanism — *plus* the heavy wheel spindle unit that resists wheel pressures — *plus* the rugged cam generating mechanism that provides enduring accuracy of the motion required for piston skirt form. And this rapid action is built-in for the life of the machine, thanks to massive proportions and generous wear surfaces.

Other High Production Advantages

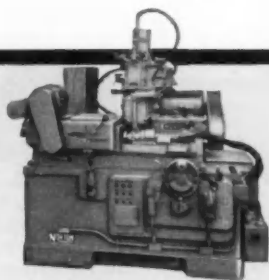
- **Simplified Operation** that reduces operator fatigue through convenient location of controls. The operator can make all adjustments for feeds and speeds without leaving his normal position.
- **Automatic Functioning** that operates at a pre-determined pace, hour after hour, minimizing effort and increasing production through elimination of lag due to operator fatigue.
- **Automatic Grinding Cycle**, operating under electrically timed control and adjustable over a wide

range. Starting at the touch of a single lever, the grinding cycle terminates at the pre-set time, ready for removal of the work. (Rotation of the work may be stopped automatically, in the most convenient unloading position, by an optional "electric-eye" arrangement.)

- **Automatic Wheel Truing.** Merely touching a push-button sends the wheel head mounted automatic truing device on a round trip across the wheel face at pre-determined speed and feed. This not only lessens the time and skill usually required for truing, but gives closer control of the amount of abrasive removed, thus reducing the wheel cost per piece ground.

Get the Whole Story

on how the Norton 6" x 8" Semiautomatic Piston Grinding Machine can benefit your production. See your Norton Representative, or write direct for Catalog No. 742. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Massachusetts.



IDEAL FOR AUTOMATIC LOADING. Already greatly simplified in operation, and with many automatic features, this advanced grinder is readily adaptable for automatic loading and unloading. Also, it is available under the Norton Lease and Purchase Financing Plans, which enable you to modernize while conserving your capital. Full particulars on request.

To Economize, Modernize with NEW

NORTON

GRINDERS and LAPPERS

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes

District Offices: Worcester • Hartford • New York Area, Teterboro, New Jersey • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

Five cylinder series... each the best of its kind!

Here you see one more reason why experienced cylinder users prefer Hannifin cylinders...there is a Hannifin cylinder series for every type of service.

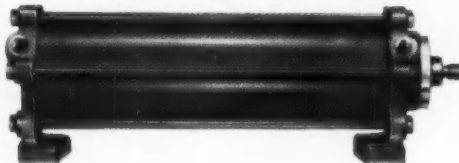
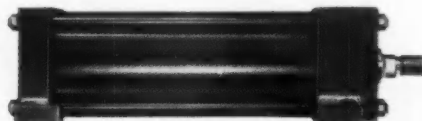
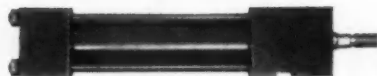
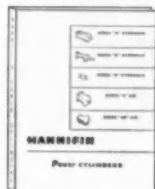
What pictures cannot show you is the extra effort that goes into every Hannifin cylinder, all the way from the drawing board to the shipping dock. This brings you design features other cylinders simply do not have...superior workmanship where it's most needed for long, trouble-free service...and better delivery promises, better kept. All at prices no higher than you may have been paying for less satisfactory cylinders.

There's a Hannifin man near you—or, if the need is urgent, call us long distance. He or we will welcome the opportunity to help you as you select the Hannifin cylinder series that best meets your needs.

AIR AND HYDRAULIC **HANNIFIN** POWER CYLINDERS

COMPLETE CYLINDER FILE

Write for your copy of this new Hannifin Cylinder File...complete, easy-to-use, easy-to-order-from information on five lines of Hannifin cylinders. Write Hannifin Corporation, 543 S. Wolf Road, Des Plaines, Illinois.



RB&W

FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By John S. Davey

Fastener coatings

Salt spray testing of various metallic coatings used on fasteners doesn't always give a true picture. In actual service, accelerated test results are not always borne out.

Reason: The tests favor the coatings which can endure continuous moisture and salt atmospheres, whereas some do better under the normal intermittent dry and wet conditions of weathering.

Experience has developed a "scale" of suitability of various coatings for fastener protection.

FOR RUST PROTECTION

Hot galvanizing offers greatest endurance under most conditions. It falls short on highly stressed fasteners.

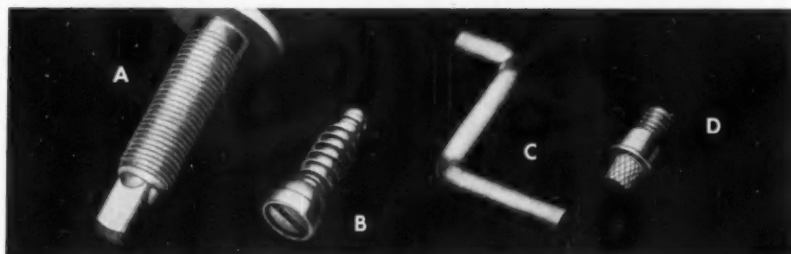
Electrodeposited zinc is next most practical—providing good appearance, controlled tolerance at threads, and ability to take high bolt tensions.

Cadmium plate stands out where salt atmospheres predominate. Not suitable for contact with edibles, it is ruled out for many appliances.

For general applications, the rust prevention of black oxide coatings proves satisfactory. Phosphate coatings, too, offer some degree of protection, but not under severe conditions.

Chromium, plated over copper, should be considered more for its appearance on fasteners rather than protection.

Cold heading creates quality parts the low cost way



No value analysis of product components is really complete without exploring what cold heading machines can do to cut costs. Some examples:

A. ELIMINATE EXTRA OPERATIONS. Leveling screw, formerly made by riveting flat disc to set screw, now emerges as a stronger, single piece from a cold header.

B. ONE PIECE BETTER THAN TWO. Cold headed hose clamp screw has integral flange which, after head is slotted, is forced up to form screw-driver shield. Before, piece was in two parts . . . with screw made on screw machine, and the shield a stamping fitted around head during assembly.

C. FASTER THAN FORGING. Shifter lever is bent into double "L" automatically in bolt header . . . replacing

ing 2-stage forging operation. The header does it at high speed from continuous rod.

D. METAL FLOWS TO SHAPE—NO WASTE. No longer cut on screw machine, insert screw for plastic parts costs 40% less. Cold header uses just the amount of metal required. The threading and knurling, too, are done automatically at high speed.

Metal forced to cold flow into shape results not only in savings but also in stronger parts. With uncut flow lines, the piece is better able to withstand stress concentrations.

For an expert opinion on parts you now use, check with Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

12-point fasteners cut wrench clearance space

Double hex RB&W bolts and nuts measure smaller across their points than single hex fasteners. Used with an external socket wrench, they permit optimum driving torque to be applied.

Thus, while permitting design of more compact assemblies, these fasteners also assure proper preloading for stronger connections.

Available with plain flange, or SPIN-LOCK design which incorporates teeth that embed upon tightening and resist loosening under vibration or temperature changes.



How automobile engines were

HARPER'S WEEKLY



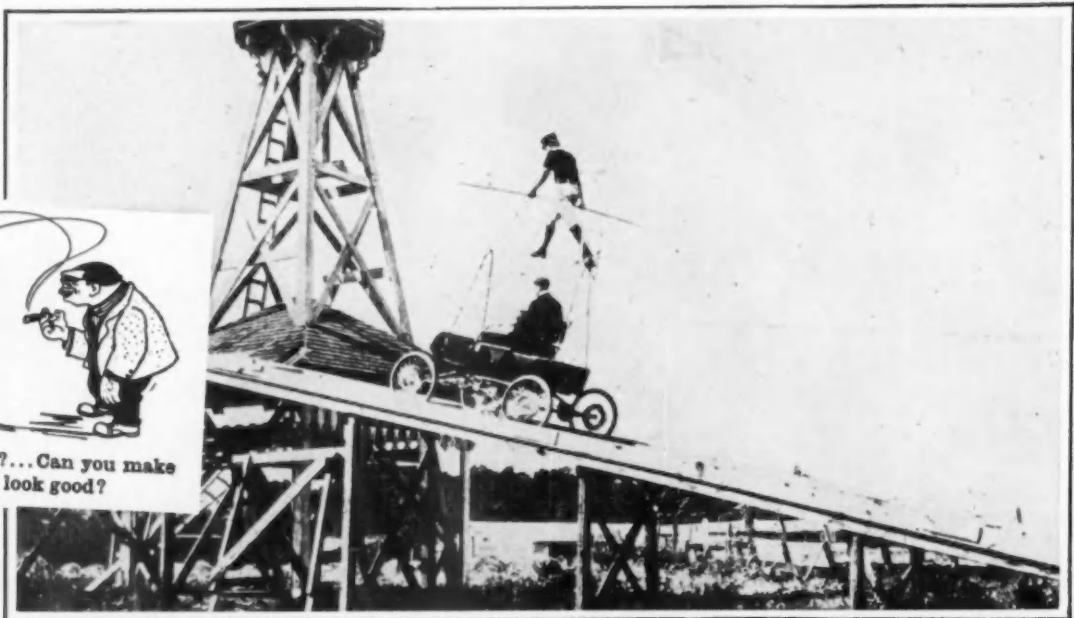
The page reproduced at left is from an August, 1903, issue of HARPER'S WEEKLY. It describes one of the first known attempts to measure vibration in automobile engines.

A Wire-rope Performer testing the Amount of Vibration of an Auto in Motion

A New Plan for Testing Autos

CONNECTED with an automobile factory in Michigan there is a very novel testing-ground for automobiles. It includes a speeding-track which is perfectly level, and which is macadamized to give a smooth surface. In addition, an incline has been constructed which has a grade considerably steeper than the average hill encountered on the highway. Not only is the full power of the auto tested on the track, but its climbing capacity as well. One of the principal faults liable in a motor vehicle is the vibration caused by the irregularity of the engine when in motion. The absence of this vibration is essential to the comfort of the occupant. On this proving-ground ex-

periments are made to determine the extent of vibration, as shown in the photographs. They assume the form of tight-rope performances. An "aerial artist" balances himself upon a bar supported by a framework which is attached to the body of the ordinary runabout. The runabout is operated at various rates of speed, both on the level track and on the incline. The amount of vibration of the engines is decided largely by the ability of the wire-walker to keep his balance while the auto is in motion. The feat of balancing on a wire while the auto is going up grade, however, calls for considerably more skill. When the trial is successful, it is due to the uniform movement of the engine.



An "aerial artist"?... Can you make our engines look good?

The Test on an Incline—if the Rope-walker can keep his Balance, the Engine is considered to be in good working order

balanced in 1903 B.D. (Before **DYNETRICS**)

THIS BLAST FROM THE PAST...
shows why it pays to keep up with the times!

A lot of water has run under the bridge since 1903! During that same year the first trans-continental "auto" trip was completed at New York; the Wright Brothers were making their first successful flights at Kitty Hawk.

We've come a long way together in achieving today's high standards of manufacture and

product performance. Gisholt worked with every industry, developed the equipment for balancing rotating parts weighing from a fraction of an ounce to many tons—for balancing parts a few at a time or by the thousands on a high-production basis.

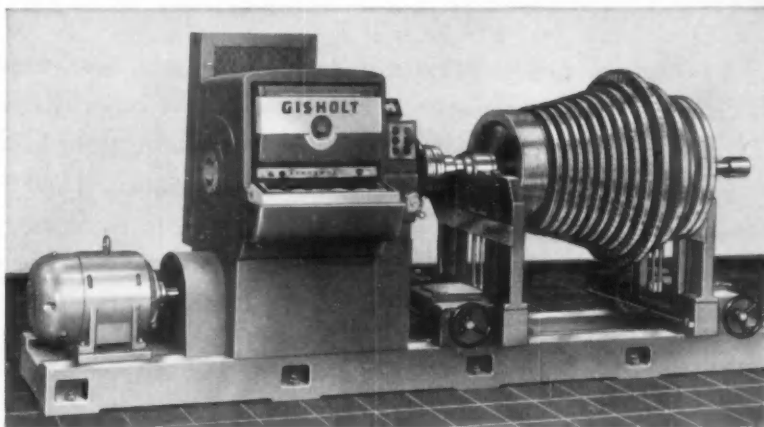
How balancing is performed in 1957 A.D. (After **DYNETRICS**)

Gisholt DYNETRIC Balancers use electrical networks to provide the necessary amplification for precise readings, eliminate guesswork by separating and isolating unbalance effects, for maximum accuracy and ease of correction on all types of work. No charts or graphs are

needed; the amount of correction is indicated in units most practical for the work. Whether you balance parts from a fraction of an ounce to 150 tons, there's a Gisholt Balancer to give you the highest known standards at the lowest possible cost.



Gisholt 15 Balancer for parts up to 12" diam. weighing 1 to 30 lbs.



Gisholt 6U Balancer for parts up to 68" diam. weighing 500 to 10,000 lbs.

IS YOUR BALANCING UP TO DATE?

The way to be sure that you are not missing out on developments that can save you time and money—and improve your product—is to write for Gisholt's General Balancing Catalog Form 1109BD.



GISHOLT

MACHINE COMPANY

MADISON 10, WISCONSIN, U.S.A.

**Find out whether
this new machine
will bore your
parts 3 to 8
times faster!**



Parts with long holes . . . or identical parts,

The new LeBlond-Carlstedt Rapid Borers solid bore, trepan or counterbore holes 3 to 8 times faster than by the conventional D-bit method! Hole capacity from 5/16" to 4-1/4" diameter. Basically, the Rapid Borer is suited to work that is symmetrical for balance in rotation—round, square, octagonal, tapered or stepped. A wide variety of hole diameters and depths as well as work sizes can be handled.

The Rapid Borer was developed expressly to accommodate revolutionary new tooling which cuts at very high speed with good accuracy and finish. Cutting oil at high pressure is forced between the boring bar and hole wall forming a continuous bearing. It flushes back through a hole in the boring head and bar, carrying away the chips as it goes. Chip form is controlled both by tool angles and proper feed and speed combinations; thus tool faces are kept clean and chip passage clear. Cutter design produces balanced cutting pressures thereby controlling concentricity.

This new tooling requires a machine with the following characteristics, all of which are incorporated in the LeBlond Rapid Borer design—High spindle horsepower; Ample rigidity throughout; Complete absence of vibration at all speeds; Infinitely-variable feeds, independent of speeds, while running under load; Final drive to spindle through belts; Large volume of cutting oil. Available in 3 sizes, No. 15, No. 30 and No. 60.

Tell us about the holes you'd like to produce faster. Large holes or small. If the Rapid Borer can handle the job, we'll show you how to produce them faster than ever before. Other equipment available for holes larger than 4 1/4".

THE R. K. LeBLOND MACHINE TOOL COMPANY
Dept. N. Cincinnati 8, Ohio

Gentlemen:

We want to know if your Rapid Borer really will bore our part 3 to 8 times faster.
Here's a description of the job.

Size of hole to be bored _____

Length of hole to be bored _____

Annual production of parts _____

Material and Hardness _____

Conformation of part and dimensions (send sketch or print) _____

Name _____

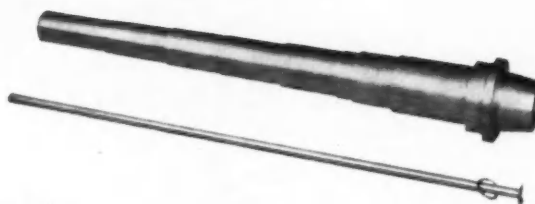
Title _____

Company _____

Address _____

City _____ State _____

bored as one piece, then cut apart.



These tremendous production savings can be yours!

Rapid Borer Time: 5.2 minutes

D-Bit Time (old method): 41.5 minutes

Hole diameter ... 1-17/32"

Hole length ... 31 1/4"

Part material ... C-1141 Hot Rolled 187 Brinell

Part outside diameter ... 2.450" at small end, 2.710" at large end.

Feed rate (solid bore)6" per minute

Rapid Borer Time: 17.75 minutes

D-Bit Time (old method): 86 minutes

Hole diameter ... 2-3/16" Core diameter852"

Hole length ... 53 3/4"

Part material ... 4140 Forging 200 Brinell

Part outside diameter ... 3.455" at small end, 4.425" at large end.

Feed rate (trepanning)3" per minute

For complete information write for Bulletin LC 201 N

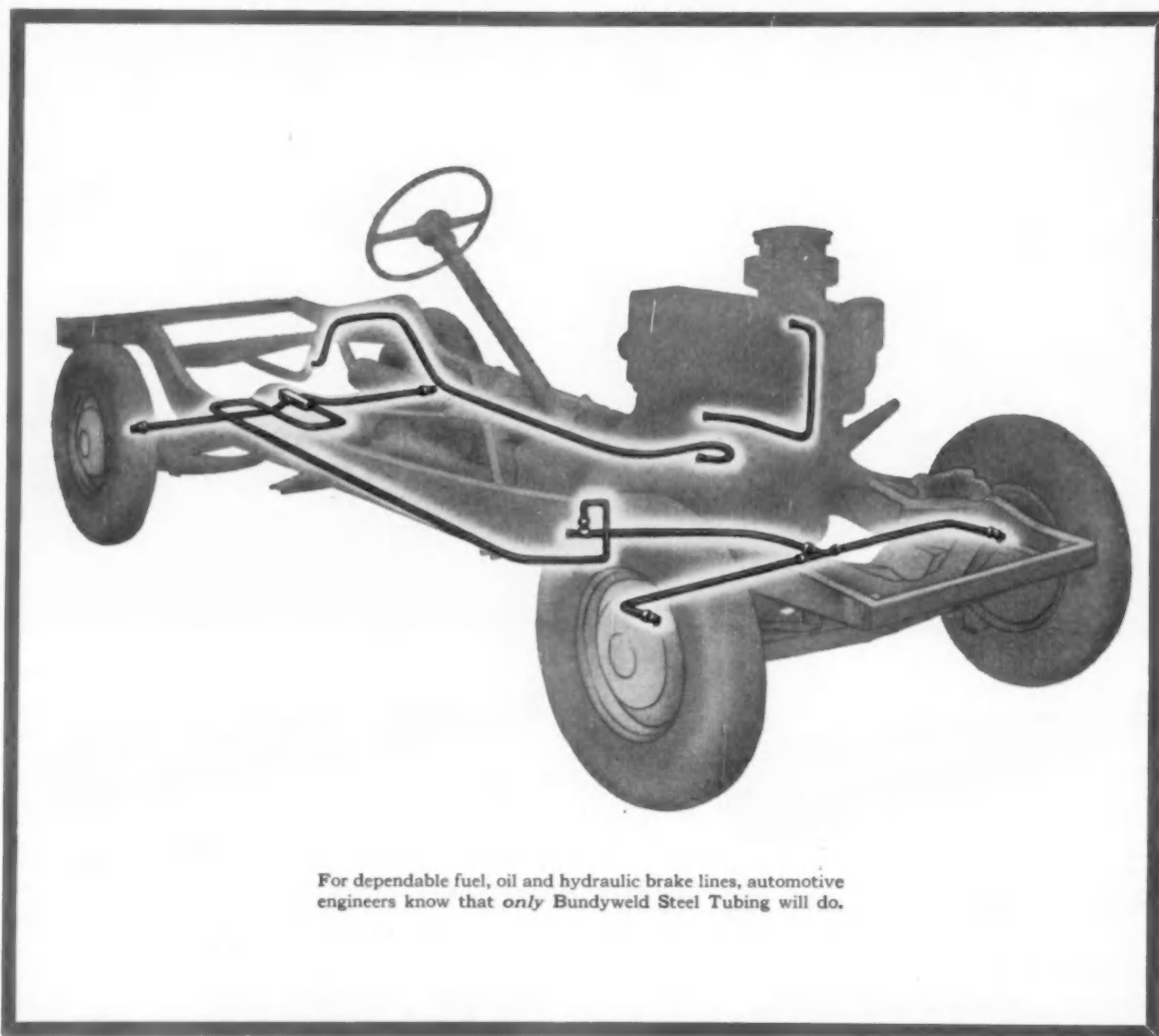
THE R.K. LeBLOND MACHINE TOOL COMPANY

Cincinnati 8, Ohio

World's Largest Builder of a Complete Line of Lathes for more than 70 years



For safety and dependability there's no real substitute



For dependable fuel, oil and hydraulic brake lines, automotive engineers know that *only* Bundyweld Steel Tubing will do.

BUNDYWELD IS DOUBLE-WALLED FROM A SINGLE STRIP



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



SIZES UP
TO 1/8" O.D.

NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.

in automotive applications, for Bundyweld Steel Tubing

**Proved by billions of miles over every type of road:
you get more than tubing when you specify Bundyweld!**

When you specify tubing for brake lines (or other automotive applications), it pays to look beyond cost-per-foot alone. Just consider what *else* you get with Bundyweld® Tubing.

You get safety, proved in the billion-mile operation of cars, trucks, tractors and buses all over the world. In the last 25 years, over two billion feet of Bundyweld Tubing have been used for tubing parts on these vehicles in every price class.

You get dependability with Bundyweld—the world's finest automotive tubing. Double-walled from a single *steel* strip, it is metallurgically bonded through 360° of wall contact. So Bundyweld is extra-strong . . . highly resistant to brutal shock

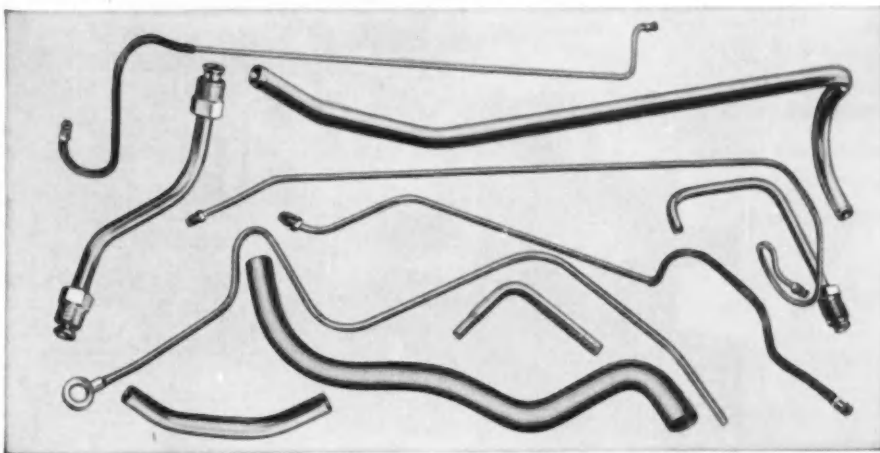
and vibration fatigue. *Bundyweld is used on 95% of today's cars, in an average of 20 applications each.*

You get savings. Bundyweld arrives on schedule, clean and ready to use. It comes prefabricated by Bundy® to your specifications . . . or in lightweight, easy-to-handle lengths, ready for fast, economical fabrication in your plant. And Bundy offers you free, expert engineering and design services that add up to more savings.

So consider performance . . . consider over-all cost. On either basis, automotive engineers everywhere know from experience that there is no real substitute for Bundyweld Tubing. But find out for yourself. Call, write or wire us today.

BUNDY TUBING COMPANY, DETROIT 14, MICHIGAN

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY



Shown here are but a few of the countless shapes in which Bundyweld Steel Tubing is fabricated for automotive applications.

There's no real substitute for

BUNDYWELD® TUBING

Bundy Tubing Distributors and Representatives: *Massachusetts:* Austin-Hastings Co., Inc., 226 Binney Street, Cambridge 42 • *Pennsylvania:* Rutan & Co., 1 Bala Ave., Bala-Cynwyd • *Midwest:* Lapham-Hickey Steel Corp., 3333 W. 47th Place, Chicago 32, Ill. • *South:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg., Chattanooga 2, Tenn. • *Southwest:* Vinson Steel & Aluminum Co., 4606 Singleton Blvd., Dallas, Texas • *Northwest:* Eagle Metals Co., 4755 First Avenue South, Seattle 4, Wash. • *Far West:* Pacific Metals Co., Ltd., 2187 S. Garfield, Los Angeles 22, Calif. • *Pacific:* Metals Co., Ltd., 1900 Third Street, San Francisco 7, Calif.

Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

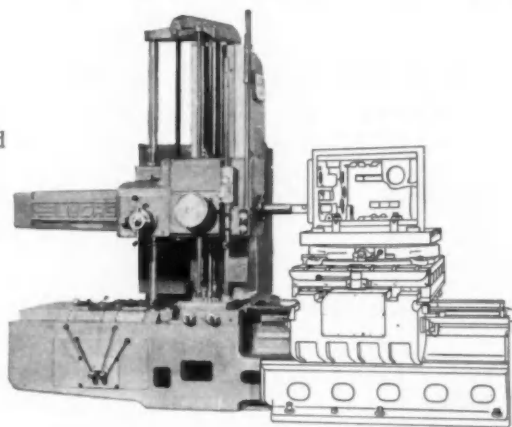
**Select
a Lucas**

**for accurate spacing
for precision boring
for heavy milling**

Your choice of controls —

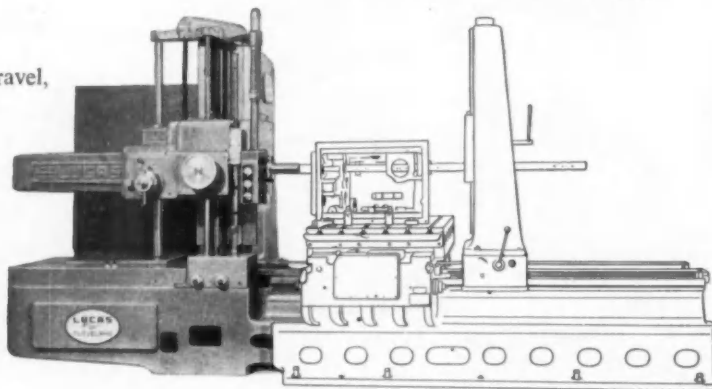
STANDARD LEVER CONTROLS

available for use with both short bed or backrest models.



FULL PENDANT CONTROL

of feeds, speeds and directional travel, optional on any Lucas.

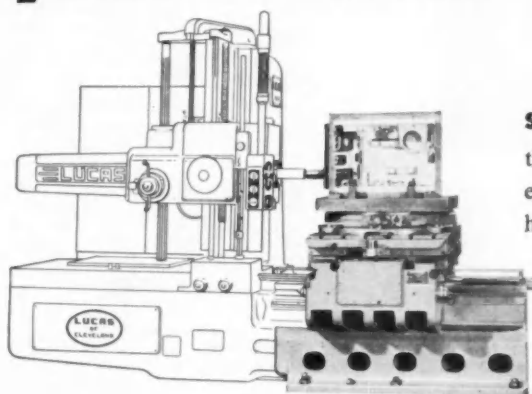


Whether you do line or stub boring, whether you prefer lever or automatic pendant control, you get the basic advantages of automatic power positioning and 4-way beds. Whichever model you

select you get the benefit of continuing design improvement, backed by 57 years of specialization and leadership in this field *plus* the full resources of The New Britain Machine Company.

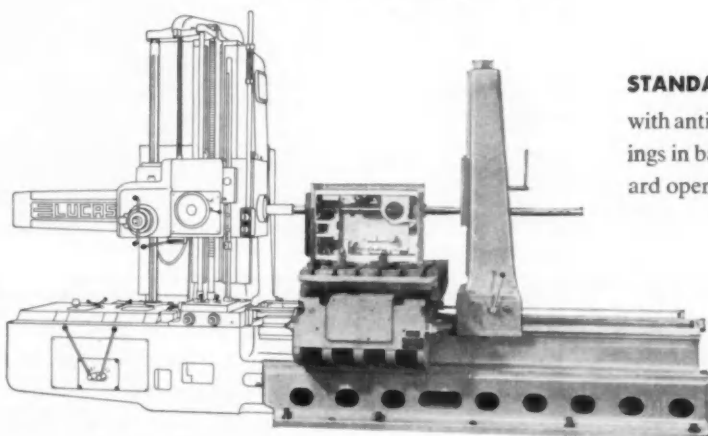
in production
 in the tool room
 in experimental work
 in engineering research
 in maintenance applications
 or several, in combination

your choice of beds



SHORT BED MODELS

the most compact and economical equipment for precision stub boring, heavy milling and horizontal drilling.



STANDARD BED WITH BACKREST

with anti-friction bearing mounted bushings in backrest block, handles all standard operations including line boring.



LUCAS MACHINE DIVISION

The New Britain Machine Company
Cleveland, Ohio

OTHER NEW BRITAIN MACHINE TOOLS DIVISIONS

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Saginaw, Michigan

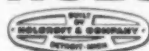


Obsolescence, unlike depreciation, is *not* a loss factor that can be estimated and provided for out of income. Yet, the operation of obsolete equipment *does* cost money . . . a cost that represents, more often than not, a loss far in excess of depreciation.

When you are buying new heat treat equipment, it is only good practice to buy with an eye to the future. By looking into such problems as atmospheres, automation, safety, mechanics, hydraulics and so on . . . today . . . you materially reduce tomorrow's obsolescence factor. Sometimes, existing furnaces can be redesigned with modern techniques and, as a result, can be geared to present production demands.

In any case, it is a good idea to talk over your problem with a Holcroft engineer. He has the technical know-how, the training and practical experience, to help you reduce early obsolescence in your plant. You'll find that Holcroft furnaces are built to answer today's problems—and tomorrow's too. Write for information.

HOLCROFT AND COMPANY



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CALENDAR OF COMING SHOWS AND MEETINGS

- ASME Power Conference, Americus Hotel, Allentown, Pa. . . . Oct. 21-23
- National Safety Congress and Exposition, 45th annual meeting, Hotel Conrad Hilton, Chicago, Ill. Oct. 21-25
- Contour Machining Conference, annual meeting, Ambassador Hotel, Los Angeles, Calif. . . . Oct. 23-24
- Computer Application Symposium, Hotel Sherman, Chicago, Ill. . . . Oct. 24-25
- National Machine Tool Builders' Association, annual meeting, French Lick - Sheraton Hotel, French Lick, Ind. Oct. 23-25
- American Society of Body Engineers, annual technical convention, Rackham Bldg., Detroit, Mich. Oct. 23-25
- National Management Association, 34th national conference, Penn-Sheraton Hotel, Pittsburgh, Pa. . . . Oct. 25-26
- American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. Oct. 27-30
- National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, Ill. . . . Oct. 28-30
- National Industrial Packaging & Handling Exposition, Convention Hall, Atlantic City, N. J. . . . Oct. 28-31
- Industrial Management Society, 21st annual clinic, Hotel Sherman, Chicago, Ill. Oct. 30-Nov. 1
- International Motor Show, Turin, Italy Oct. 30-Nov. 10
- National Metals Exposition and Congress and Second World Metallurgical Congress, International Amphitheatre, Chicago, Ill. Nov. 2-8
- SAE Transportation Meeting, Hotel Statler, Cleveland, O. Nov. 4-6
- American Institute of Electrical Engineers, ninth annual Machine Tool Conference, Hotel Schroeder, Milwaukee, Wisc. Nov. 4-6
- SAE Diesel Engine Meeting, Hotel Statler, Cleveland, O. Nov. 5-6
- SAE Fuels and Lubricants Meeting, Hotel Statler, Cleveland, O. . . . Nov. 6-8
- American Standards Association, annual meeting, St. Francis Hotel, San Francisco, Calif. . . . Nov. 13-15
- Air-Conditioning and Refrigeration Exposition, International Amphitheatre, Chicago, Ill. . . . Nov. 18-21
- ASME Annual Meeting, Hotel Statler, New York, N. Y. Dec. 1-6
- Eastern Joint Computer Conference, Sheraton Park Hotel, Washington, D. C. Dec. 9-13
- Society of the Plastics Industry Conference, Hotel Commodore, New York, N. Y. Dec. 10-11



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STANLEY APPLEBY—Comptroller

High Spots of This Issue

Specialized Handling Equipment

Specialized handling equipment designed and built by Budd Co. is being used in the assembly of Chrysler chassis frames at Budd's Red Lion Plant in Philadelphia. The sequence of major assembly operations on the Plymouth chassis frame line is described here. Page 48.

Chrysler Cars for 1958

This article covers some of the new mechanical features that are available on cars being produced by Chrysler Corp.'s four passenger car divisions for 1958. These include fuel injection, the Sure-Grip differential, and constant control power steering. Page 52.

1958 Chevrolet Trucks

The Chevrolet truck line for 1958 includes 128 models on a range of 22 different wheelbases. Details are given here of the entirely new 348-cu in. engine—one of five basic engines available—which features, among other things, a new cylinder block and head. Page 54.

Studebaker Sedans and Station Wagons

Studebaker-Packard makes a strong bid for a larger share of the 1958 passenger car market with its most varied line in recent years. The engine line-up, wheel sizes, transmission options, exterior styling, and other highlights of the S-P line are given here. Page 58.

Rambler and Ambassador Models for 1958


American Motors Corp. has dropped the Hudson and Nash names and combined its 1958 line under the Rambler name. Its restyled line of six- and eight-cylinder Ramblers consists of 11 models built on a 108-in. wheelbase. Page 66.

31 New Product Items

And Other High Spots, Such As:

Holley Road Speed governor; bearing cup production; European vehicle developments; cylinder block leak test; control of exhaust gases; Curon; new 17 M Tannus; BMW 600; Farm Equipment Institute Convention; Westinghouse test facility; and industry statistics.

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 117, No. 8

October 15, 1957

Sales of 180,000 Cars in 1958 Is Goal Being Sought by AMC

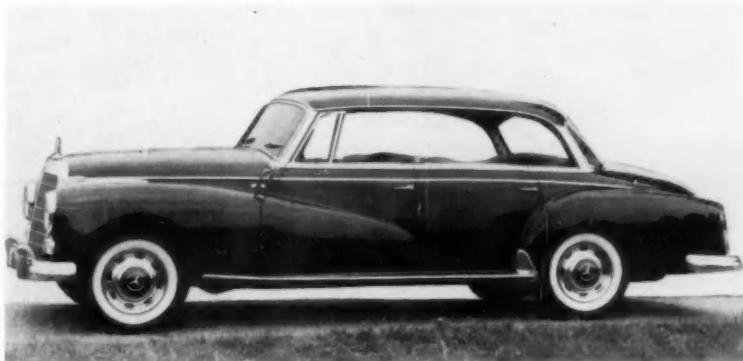
American Motors Corp., with all of its U. S.-made cars bearing the Rambler name in 1958, hopes to sell 180,000 cars during the coming year. AMC has dropped the Hudson and Nash names and combined its 1958 line under the Rambler name. Included are the 100-in. wheelbase Rambler American; 108-in. wheelbase Rambler Six and Rebel V-8; and the new senior series, 117-in. wheelbase Ambassador by Rambler.

George Romney, AMC president, told newsmen at the company's press preview earlier this month that he definitely expects the company to be in the black for 1958. His prediction of 180,000 cars is an optimistic one. For the fiscal year ended Sept. 30, AMC sold 119,000 units, of which 86,000 were Ramblers. He said that AMC can make money with 150,000 cars, and should make "a whole lot of money" with 180,000 cars under the present integration program.

All Ramblers but the American will share the same basic body shell, and will bear many common styling features. The American in reality is the 1955 100-in. Rambler with no styling changes. It will have available, however, automatic transmission. The American will not go into production until around Dec. 1.

AMC will introduce air suspension later in the model year on the Ambassador and Rebel models. The AMC system will be on the rear wheels only and will retain coil spring suspension on the front.

Mr. Romney predicted that in 1958 the "small and compact" car will tally eight per cent of the market and by the 1960's should account for 50 per cent. Sales of cars with a 108 in. wheelbase or less should reach about 4.5 per cent this year, he said, as against 2.8 per cent a year ago and 1.2



MERCEDES-BENZ HAS LONGER WHEEL-BASE

Mercedes-Benz 300 with sleeker body lines and longer 124-in. wheelbase uses intermittent manifold-type fuel injection that raises output of the six-cylinder engine by 30 per cent. The 182.8 cu in. power unit with 8.55 to 1 compression now develops 180 bhp at 5500 rpm. Fitted as standard equipment, the automatic transmission includes an anti-creep and roll device which holds the car stationary when it is at rest with the engine idling.

per cent the previous two years. AMC will continue to import the Austin-built Metropolitan in 1958.

Colbert Sees New Car Sales Passing Six Million in '58

L. L. Colbert, president of Chrysler Corp., predicts that the retail sales of new cars may pass the six million mark in 1958, and probably will come close to that figure even this year.

Mr. Colbert made his forecast at the Chrysler Corp. national press preview in Miami Beach, Fla., last month (Sept.). He told newsmen that Chrysler, to help increase productive efficiency and to supply capacity for the anticipated size of the future market, is investing about \$130 million during 1957 on new plants and equipment, exclusive of special tooling. He added that the company probably will invest about the same amount next year.

One basis for Mr. Colbert's op-

timism about his own company's future was the increasing number of competitive makes traded in on Chrysler products during the past model year, and the widespread popularity of Chrysler styling. He also pointed out that since the number of new cars sold in the past three years totaled well over 19 million, and a large proportion of trade-ins come from this car age group, there appears to be "favorable conditions for a healthy market in the coming year." He added that many of the people who bought on long term credit in the record sales year of 1955 will be in a position to be back in the market in 1958.

Mr. Colbert said that Chrysler ended its 1957 model run with U. S. production of 1,213,000 passenger cars.

Here are a few highlights of the 1958 Chrysler Corp. cars previewed in Miami Beach, Florida:

In styling, all five lines retain the dart-shape or wedge theme of cur-

News

AUTOMOTIVE AND AVIATION



VAUXHALL FEATURES PANORAMIC WINDSHIELD

New six-cylinder Vauxhalls, made in Britain by General Motors, feature a panoramic windshield, three-piece rear window, and greater length and width but lower height than the previous Velox and Cresta models. Overall length is 14 ft 10 in., width 5 ft 5½ in., height 4 ft 9 in., and wheelbase 8 ft 9 in. The oversquare 137.9-cu in. engine (see A.J., Aug. 1, 1957, p. 34), develops 82.5 bhp at 4400 rpm, and is fitted with automatic choke. Transmission incorporates a three-speed gearbox with synchromesh on all ratios.

rent models, with high-rising rear fins. Swept back windshields appear on nearly all models. A range of 87 solid colors and 371 two-tone combinations, including more metallic colors, is offered.

All cars have greater glass area, dual headlights, Torsion-Aire suspension and new Hi-Temp brake fluid. Offered as special equipment are non-slip differential, Constant Control power steering, Auto-Pilot speed control (on Chrysler and Imperial), a two-evaporator air conditioner (on all but Plymouth), electric door locks (on Imperial). Fuel injection is available in limited production on certain models. New engines of 350 and 361 cu in. displacement include Plymouth Golden Commando, Dodge

Ram-Fire and D0500 and De Soto Turboflash.

(See p. 52 of this issue for a detailed engineering story on the five Chrysler Corp. lines for 1958.)

Automobile Industry Planning New Safety Devices in 1958

The 1958 automobiles will reflect greater interest in passenger safety with the introduction of several new safety devices and the wider use of others that until now have been only minor factors.

Industry-wide adoption of non-slip differential, pioneered by Packard, is a key safety addition. All companies will offer the locking differential on at least one model. Another mechanical

improvement contributing to better safety is improved power steering. Greater call for power steering and power brakes also should figure in the overall safety picture.

Speed control units and speed warning devices will get big play in 1958. Chrysler and Imperial will offer an automatic speed control unit which will maintain a preset cruising speed. Speed warning devices—bells, lights and buzzers which warn the driver—will be offered by several makes.

Dashboards will provide more protection against injury in case of accident. For one thing, padding will be used more extensively—on the dashboard, on visors, and below the dashboard at knee level. There will be fewer projections, with controls in some cases completely flush with the panel. One sports car will have a bar across the dashboard for passengers to grab in emergency.

At least two makes are planning driver-controlled locks on all four doors, something of value when children are in the back seat.

Increased visibility will be an important improvement. This will come through greater glass area, the "compound" windshield that wraps into the roof, and also through improved nighttime illumination with the dual headlight system. One make is planning a "de-fogger" for the rear window to speed clearing in the winter.

NACA Will Spend \$45 Million On Missile Test Facilities

The National Advisory Committee for Aeronautics plans to spend \$45 million on test facilities where government research on faster missiles can be carried out.

Specialized wind tunnels and supporting equipment for hypersonic flight studies are to cost nearly \$21 million, the NACA says. Added to this will be improvement and expansion of present facilities, bringing the total construction authorized under a newly signed law to \$45 million.

Principal new units are to be a wind tunnel, where flight conditions up to 7000 mph can be simulated; a second tunnel, where helium will be used as a test medium; and a high-speed addition to a present tunnel for duplicating speeds as high as 10 or 12 times the speed of sound.

The law authorizes more than \$5 million for broadening the study of atomic-powered aircraft. A research facility that NACA now has under construction for this work will be extended. High-level radiation tests will be conducted as part of the work.

Aluminum, Lithium Combined To Form New Jet Plane Alloy

A new aircraft alloy that combines aluminum and lithium, lightest of the metallic elements, has been developed by the Aluminum Co. of America.

The discovery, which is said to represent a major scientific breakthrough in light alloy research, was disclosed at a session of the SAE National Aeronautical Meeting. Company officials said that the new lithium alloy retains high strength up to 400 F, more than 100 degrees higher than previous alloys.

G. D. Welty, Alcoa's aircraft industry manager, said jet planes traveling 1600 mph at operating altitudes develop "skin" temperatures of about 350 F. Conventional aluminum alloys used in aircraft construction begin to lose vital physical properties in the 250-350 F range, thus limiting their usefulness to speeds below 1300 mph.

Samples of the new material, designated X2020, are being supplied to the Air Force, the Navy's Bureau of Aeronautics, and to major aircraft companies for study and evaluation. The company said that it "expects to be prepared to produce the alloy in commercial quantities by the time the performance properties of the material have been determined, and it has been incorporated into current aircraft designs."

S-P Withholds Details On European Small Car

Interest in the German Goggomobil is mounting, particularly in reports that Studebaker-Packard will assemble the small car in this country, although S-P has remained quiet on the matter so far. Earlier this year S-P president, Harold E. Churchill, said that his company was considering a small European-made car to market in this country, but no confirmation or details have been given.

AI reported on Sept. 15 (p. 33) that S-P was considering marketing a small European car, probably the Goggomobil, which is made in Bavaria by Hans Glas.

The Goggomobil was introduced in 1955 in Germany, and last year some 33,000 units were sold. The small car (less than 120 in. overall) is powered by a rear mounted two-cylinder, two-stroke air cooled engine with a 17 hp rating. Retail prices in this country probably would range from \$1000 to \$1400.

There have been reports that S-P is considering importing the Goggomobil in knocked-down form and assem-



FIRST PHOTOGRAPH OF CONVAIR F-106A INTERCEPTOR

A Convair F-106A, fastest Air Force all-weather interceptor yet flown, is photographed during test flight over the Mojave Desert, Calif. The supersonic, delta-wing plane is capable of flight to stratospheric altitudes and of ferreting out and destroying enemy aircraft in any kind of weather, day or night. Slated for operational use with the Air Defense Command, the plane is being produced at the San Diego (Calif.) plant of Convair Div. of General Dynamics Corp.



RUSSIAN TURBOPROP SEATS UP TO 100 PASSENGERS

Ilyushin IL-18 Moskva has four 4,000-hp turboprops, which are said to provide a cruising speed of 400 mph with a 3100-mile range. It seats up to 100 passengers, and is already in service with Aeroflot, the Russian airline. An even larger turboprop, the Tu-114, is scheduled for an early appearance. Derived from the Bear heavy bomber, it is understood to be powered by four 12,000-hp engines and to cruise at 560 mph in 4300-mile stages.

bling the units at a plant in this country. This would make the S-P operation unique, since all other American car companies importing cars bring them in in built-up form.

Oldsmobile Is Aiming to Get Eight Per Cent of Car Market

Oldsmobile is banking heavily on air suspension and greater fuel economy to capture a bigger share of industry sales in 1958.

J. F. Wolfram, Oldsmobile general manager, told a press conference this month in Detroit that Oldsmobile is aiming for eight per cent of the total market in the coming year. Based on a 6 million-car total, this would be 480,000 units, but he added that 500,000 cars was not beyond consideration.

To gear for this increased production, Oldsmobile is planning to hire an additional 2400 employees at its Lansing, Mich. plant by Dec. 1, bring-

ing the total to 13,000 workers. This would be about 2000 above the year's average employment.

Air suspension, called "New-Matic Ride," will be an extra-cost option on all models. One feature of the Oldsmobile system is the "closed circuit" of recirculating air. With an extra tank (low pressure), the system is able to reuse air discharged from the four bellows. Mr. Wolfram said that air suspension installation will range from 10 to 15 per cent of production but may go higher.

Oldsmobile engineers claim up to 20 per cent greater fuel economy on the Dynamic 88 series with a new "Econo-Way" two-barrel carburetor, plus other engineering changes; and 8 per cent greater economy on the Super 88 and 98 series with a four barrel "quadri-jet" carburetor. This is achieved, they say, by reducing the performance of high-speed horsepower and converting it to medium and low speed economy with leaner mixture.



Ford's Styleside pickup features triple drive range automatic transmission.

Ford Adds Three New Models To 1958 Continental Series

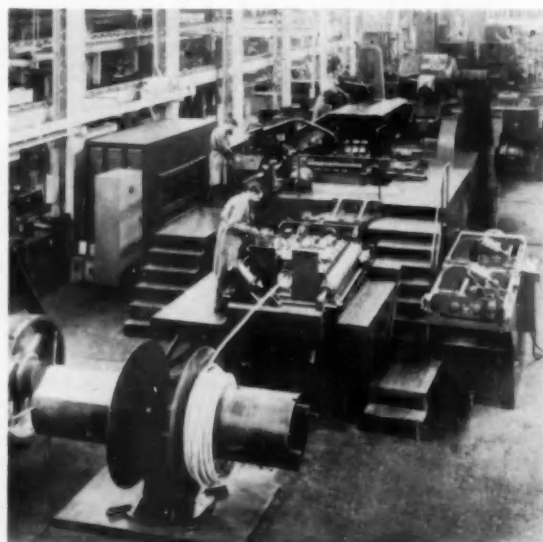
Ford Motor Co. will reduce prices substantially on its 1958 Continental line and is adding three new models to the series.

James J. Nance, Ford vice-president and general manager of Lincoln-Mercury Div., told a press conference that in addition to the two-door Continental hardtop, Ford will offer two four-door sedans and a retractable-

top convertible in the Continental series.

The new Mark III Continental is built on a wheelbase of 131 in., with an overall length of 229 in. It will be powered by a new V-8 engine, with 375 bhp at 4800 rpm, and a compression ratio of 10.5 to 1.

Detailed features as well as prices of the new cars are being withheld pending public introduction in November.



BOLTMAKER

Reported to be the world's largest automatic cold-forging machine, this 1 1/4-in. boltmaker is now in production at Cleveland Cap Screw Co.'s plant in Cleveland. The giant machine makes possible, for the first time, the automatic production of cold steel forgings larger than 3/4 in. dia. It turns out steel hexagon head cap screws 1 1/4 in. in dia and up to 10 in. long at the rate of 40 per minute.

More Than 300 Truck Models Offered by Ford for 1958

Ford 1958 trucks, now on display at Ford dealerships throughout the country, consist of more than 300 models ranging from the Ranchero, through light, medium, heavy, extra heavy, and tandem trucks.

Highlighting the new line is the Styleside pickup (see illustration), which features new grille, dual headlights, interior trim, increased horsepower, and a new triple drive range automatic transmission.

Major engine and mechanical improvements have been incorporated throughout the line. Crankshafts, pistons, valves, and camshafts have been modified; and spark control has been improved through a new carburetor of advanced design. A new water pump with higher capacity and velocity has been added.

Heavy-duty trucks have been equipped with new heavier transmissions. Medium weight trucks will offer optional automatic transmission with improved retarding ability at higher speeds.

Horsepower in the V-8 engines for light duty trucks has been increased from 171 to 181. As in the past, heavy-duty engines will be offered as optional equipment in the medium-duty line.

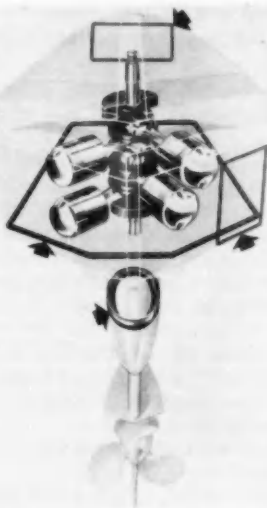
"Explosive" Sales Rise In Helicopters Is Seen

An "almost explosive" increase in helicopter sales will take place in the period 1961 to 1965, according to Don R. Berlin, president of Vertol Aircraft Corp.

Speaking before the Radio Technical Commission for Aeronautics at its fall meeting in Washington, D. C., Mr. Berlin said that the advent of free shaft turbine engines heralds a "giant step" forward in helicopter usage.

"New aircraft designed around these engines," he pointed out, "will have the capacity and the performance to bring helicopter operating costs more nearly in line with those of fixed wing aircraft."

Mr. Berlin stated that air navigation rules will have to be revised in anticipation of this growth in helicopter usage. To point up the urgency of the problem, he said the industry expects that 800 transports will be operating in airline service by 1965. "By way of comparison," he said, "the entire domestic fixed wing airline fleet in 1947 numbered only 810 aircraft."



Drawing of Evinrude's new 50 hp outboard motor shows V-type plant with horizontal placement of cylinders. Arrows indicate rubber seals which are designed to isolate sound.

Evinrude Motors Unveils V-Type, 4-Cylinder Engine

A new concept in outboard motors—a V-type, four-cylinder engine—was demonstrated recently at a New York City press preview by Evinrude Motors.

The design of the new engine, which is called the V-50, gives horizontal placement to the four cylinders, resulting in a compact unit with a low silhouette (see illustration).

The V-50 is available in two models—the Starflite, with electric starting, and the Four-Fifty, with manual. Both engines are rated at 50 hp, at 4000 rpm, and have a 70.7 cu in. displacement.

The V-50 features a twin barrel, downdraft carburetor, a new high-capacity fuel pump, and "silent outboarding," through use of rubber seals and soundproof chambers. The Starflite has a three-position key switch, which allows the motor to be locked so that it cannot be started.

In addition to its two models of the V-50, Evinrude's 1958 line includes three 35-hp motors, two 18's, and smaller models.

L. A. Young Spring & Wire Buys Link Radio Assets and Rights

L. A. Young Spring & Wire Corp. has purchased the assets and manufacturing rights of Link Radio Corp., and the Link operation is being moved to Young's Gonset Div. in Burbank, Calif. Link is L. A. Young's seventh acquisition since 1954.

TABLOID

New titanium alloys now being introduced by Mallory-Sharon Titanium Corp. are said to have a strength level roughly equivalent, on a room-temperature strength-weight basis, to steel with a yield strength of 270,000 psi.

Square D Co. has completed an electrical equipment assembly plant in Atlanta, the eighth such facility to be constructed by the firm in the U. S. since 1951.

Cessna Aircraft Co. has completed the major portion of the flight program on its four-engine pressurized Model 620 executive transport. The prototype is presently undergoing official CAA 4b certification flight testing.

Reynolds Metals Co. and Tube Investments, Ltd. of England have announced plans to form an aluminum manufacturing and sales company in the United Kingdom, to be known as Reynolds Metals & T.I. Aluminum, Ltd.

Du Pont Co. will discontinue the production of Type 168 "Super Cordura" high-tenacity rayon at its Richmond, Va., plant in preparation for starting up its new nylon plant, which is scheduled to begin producing in January 1958.

A \$550,000 sheet and strip mill for rolling copper and copper alloys has been ordered by Nacional de Cobre, S.A., Mexico City, Mexico, from Loewy-Hydropress Div., Baldwin-Lima-Hamilton Corp.

Sheffield Corp.'s Eli Whitney Metrology Laboratory is using new atomic isotope tubes as "lamps" to provide super-accurate light sources needed to help precision industries measure dimensions as close as fractions of millionths of an inch.

A hypervelocity gun that fires midget missiles at 12,000 mph has been developed at the Naval Ordnance Laboratory, in Silver Spring, Md. The two-stage, gas-fired 40 mm gun is designed to perform basic aeroballistic research on missiles in the laboratory.

Warner & Swazey Co. is negotiating to purchase Badger Machine Co., Winona, Minn. . . . Merger of the United Specialties Co. with Industrial Enterprises, Inc., has been approved by the stockholders of United Specialties.

Work has begun on an additional \$4 million expansion at Du Pont of Canada "1956" Ltd.'s Maitland, Ont., and Kingston plants; completion is scheduled for December, 1958.

Crucible Steel Co. of America plans a \$20 million improvement program that includes purchase of a new electrically driven blooming and slabbing mill, modifications to the hot strip mill, plus additions and improvements in slab heating and other auxiliary equipment at the company's Midland Works.

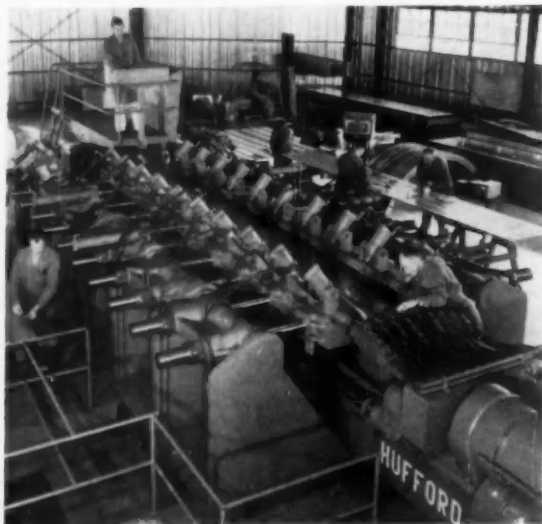
Republic Aviation Corp. has begun construction of a \$1.2 million wing tunnel facility for the testing of future aerodynamic shapes including missiles and rockets in addition to manned aircraft.

Firth Sterling, Inc. will begin production at its new tungsten carbide sintering facility in Los Angeles, in December. . . . Manufacturing operations are scheduled to begin during October in the new ferroalloy plant built by Vanadium Corp. of America, at Vancoram, O.

Employees of Delco-Remy Div., of General Motors, have been paid \$1 million for suggestions on improvements of plant operations since GM launched its Employee Suggestion Plant in 1942.

Automotive Sales Div., Timken Roller Bearing Co., has moved its sales offices and warehouse in Detroit to 16101 Schaefer Highway at the corner of Puritan Ave.

To further improve working relations between them, the American Society of Mechanical Engineers and the American Rocket Society have jointly announced that in the future each will be represented on the other's appropriate governing board.



STRETCH FORMER

Hufford Corp.'s new bi-axial stretch former was developed to a severe specification for Martin Co.'s Titan intercontinental ballistic missile program. Able to exert 1400 tons pressure on the vertically traveling die table, the machine is said to be the first bi-axial stretch former to be developed for integrally stiffened skins for supersonic airplanes and missiles. The 265,000-lb machine—40 ft long, and 16 ft wide—was built to handle skins up to 24 ft long and 5 ft wide.

Parker Appliance Co. Purchases Hannifin Corp. for \$7.5 Million

Parker Appliance Co. of Cleveland has purchased the Hannifin Corp. of Des Plaines, Ill. for \$7.5 million, and assumed the new name of Parker-Hannifin Corp. The transaction included \$5.5 million in cash, \$1.5 million in notes and the balance in Parker stock. Hannifin makes air power and hydraulic presses and cylinders and system components; Parker products are used to confine or control flow of gas, air or liquids under pressure.

Firestone Predicts Tire Sales Will Hit 111 Million in 1958

Tire sales during 1958 will reach an all-time high of 111 million units, according to Harvey Firestone, Jr., chairman of The Firestone Tire & Rubber Co. This is 2.8 per cent above the anticipated record of 108 million tires for 1957.

Mr. Firestone also said that rubber manufacturers may finish 1957 by spending more than \$200 million on new plants and equipment. Part of his own company's 1957 investment includes plants or expansions at Havana, Manila, Orange, Tex., Noblesville, Ind., and Lake Charles, La.

Another Firestone official, executive vice-president J. E. Trainer, pre-

dicted that by 1965 rubber consumption in the U. S. would reach 2,050,000 long tons and that more than 1.3 million tons or about 65 per cent of this would be synthetic. In 1956, consumption was 1,436,000 tons, of which approximately 61 per cent was synthetic.

Studies have shown, according to Mr. Trainer, that rubber plantations of the world may not be able to produce enough natural rubber to meet the needs of the future.

Curtiss-Wright, Orenda Sign Jet Engine Production Pact

Curtiss-Wright Corp. and Orenda Engines Ltd. of Canada have signed a seven-year agreement for the production of the powerful Canadian Iroquois jet engine at C-W's Wood-Ridge, N. J., plant. The Iroquois, now capable of producing 20,000 lb of thrust, is one of the most powerful jet engines in the world. With further development, the Iroquois is expected to produce up to 35,000 lb.

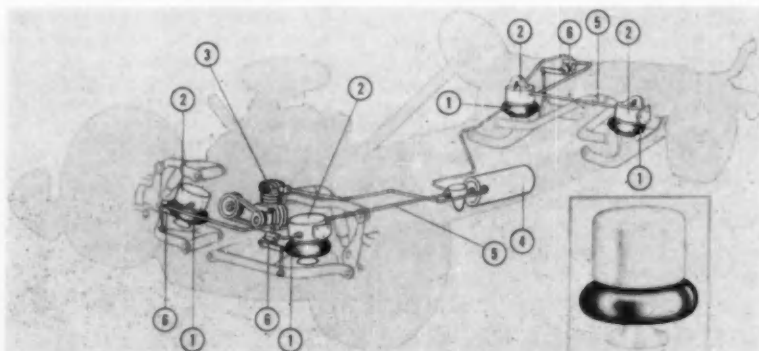
The agreement calls for production and sale of the engine in the U. S., with exchange of technical information and cooperation on further developments as part of the program. No date has been set for beginning production.

The Iroquois, according to an Orenda spokesman, will utilize the two-spool type air compressor and will be built with some titanium metal. The engine is said to weigh between 3500 and 4000 lb.

Detroit Bevel Gear Will Make Parts as New Napco Division

Detroit Bevel Gear Co., recently purchased by Napco Industries, Inc. of Minneapolis from Gear Grinding Machine Co., will build components for truck axles under Napco's military subcontract.

Detroit Bevel will continue, however, to supply gears to industrial customers and to Republic Gear Co., another Gear Grinding subsidiary. Detroit Bevel produces at a 250,000 sq ft plant in Detroit equipped with some 400 cutters and grinders.



FIRESTONE INTRODUCES NEW AIRIDE SUSPENSION SYSTEM

Connecting air lines, reservoir tanks, rubber bellows, leveling valves and an air compressor comprise the new Airide suspension system developed by The Firestone Tire & Rubber Co. Compressed air, regulated by special leveling valves, is forced into the bellows chamber to compensate for heavy loads or allowed to escape in the case of lighter loads. The exploded view shows the Airide spring (black) and reservoir mounted on its pedestal. Component parts are: (1) Airide bellows (rubber and nylon); (2) Air reservoirs; (3) Air compressor; (4) Central air supply tank; (5) Air supply lines; (6) Leveling valves.

Two Names Join the Archives As AMC Drops Hudson, Nash

Two more names—Hudson and Nash—have been dropped from the active list of automobile brands and placed in the archives with more than 2500 other automotive pioneers. American Motors is not building either car for 1958. Instead, the company has introduced a car smaller than the late Hudson and Nash but larger than the 1957 Rambler. (See p. 66 of this issue for a detailed story of the 1958 AMC line.)

The new senior car—the Ambassador V-8—shares the same body shell with the Rambler Six and Rambler V-8, but rides on a 117-in. wheelbase, nine in. longer than Rambler. Later this year, AMC will revive its 100-in. wheelbase Rambler, to be tabbed Rambler American. The English-built Metropolitan, 85-in. wheelbase car in both hardtop and convertible models, is being imported again for 1958.

Production ended in late July on Hudson and Nash cars. The first Hudson appeared in 1909, the first Nash in 1916.

The new Ambassador series includes a four-door station wagon, the first one in AMC's senior line. With the exception of the 100-in. Rambler American, the AMC line will go on sale Oct. 25.

Oldsmobile to Offer Car Radio That Can Be Used As Portable

Oldsmobile will offer something new in car radios in 1958—a transistor radio that can be removed from the instrument panel and carried as a portable.

When in place, the radio automatically plugs into the car's electrical system; as a portable, it operates on 160-hour dry cell batteries. A chrome plate flips down to cover the panel opening when the radio is out.

Called the "Trans-Portable," the radio weighs three lb and is small enough to fit into an overcoat pocket or a large handbag. Double locks on the dash secure the radio. The Trans-Portable was developed by Delco Radio Div. with cooperation of Oldsmobile engineers.

Champion Spark Plug To Build Million-Dollar Research Area

Champion Spark Plug Co. will erect two buildings adjacent to its Toledo, O., plant for research and engineering. The million-dollar center will include an engine testing laboratory, and six laboratories for research



SOVIET CAR IS INFLUENCED BY AMERICAN STYLING

This new model of the Soviet "Zil" automobile reveals the obvious influence of American automotive trends. Those hooded headlights, that wrap-around windshield and the abundance of chrome reflect "the best in the West."

and experimental work in electronics, chemistry, metallurgy, and mechanics. Champion expects the 35,000 sq ft facilities to be completed by June, 1958.

Mack Trucks Will Erect Assembly Plant in Quebec

Mack Trucks, Inc., will build its first Canadian assembly plant in Trois Rivières, Quebec, for production of buses, trucks and fire fighting equipment. Current plans call for construction to begin next spring, but details have not been set. Mack has service centers at Toronto, Montreal and Winnipeg; the new plant will assemble completed units.

AI Appoints Aviation Editor, Makes Other Staff Changes

David A. Partridge, an ex-navigator-bombardier in the U. S. Air Force, has joined the staff of AUTOMOTIVE INDUSTRIES as Aviation Editor. His last previous position was with Martin Co. in Baltimore, where he served as a member of the Technical Publications Staff.

In a series of other recent editorial shifts, Charles A. Weinert was named Eastern Editor; Andrew Shearer was made Market Research Editor; and Samuel Cummings was advanced to News Editor.

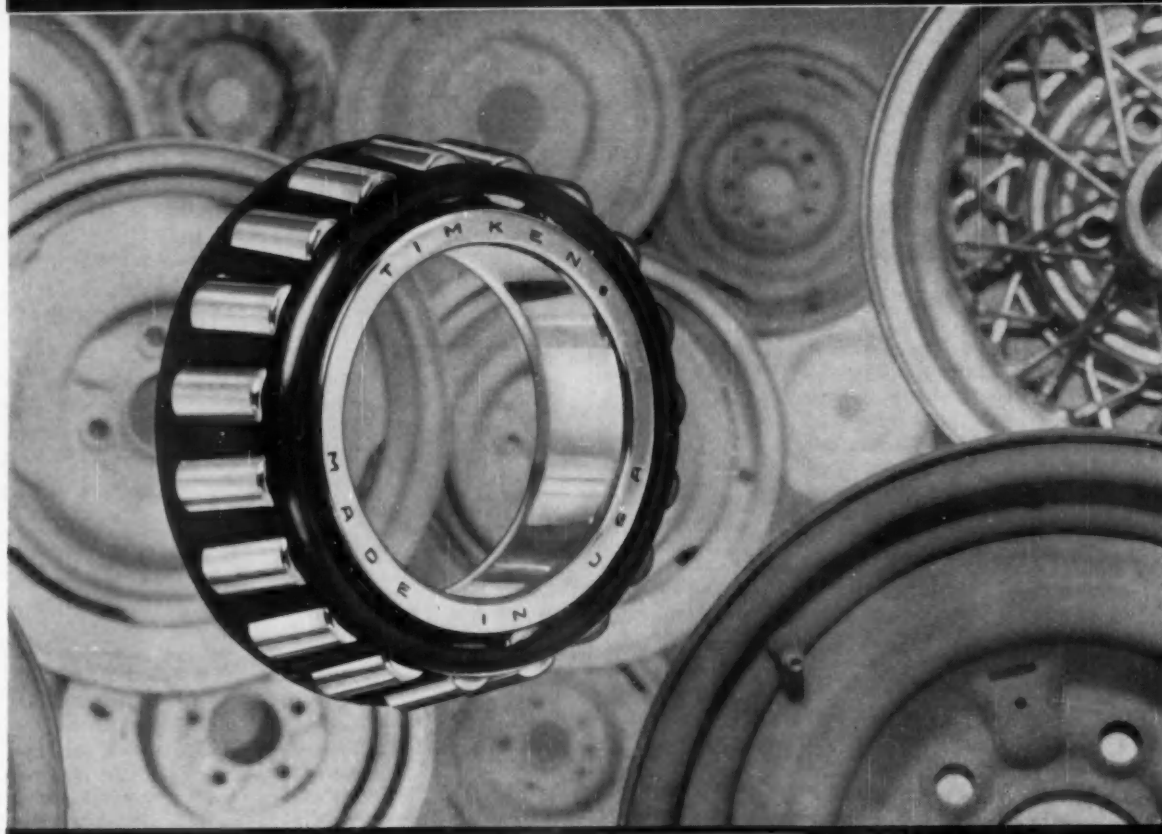


WARTBURG COUPE FEATURES LOW ROOF LINE

Coupe version of the East German Wartburg (see AI, May 1, 1957, p. 71) features a low roof line and wrap-around rear window. It is built to the standard 37-hp chassis, with drive to the front wheels. All seats fold down to form a double bed, exposing the trunk to provide room for sleepers' legs.

Meeting the big change in cars with the big change in bearings:

TIMKEN® and The Moto-Mated Way



New Timken® Moto-Mated bearings save over \$1 million in car front wheels

THIS is a new kind of Timken® bearing. It's smaller, lighter than previous designs, yet has plenty of load-carrying capacity for today's heavier, more powerful cars. It's the product of a completely modern and unique concept in bearing design, manufacture and supply—mated to the needs of the auto industry. It's a Timken Moto-Mated bearing.

This bearing, one of thirteen standard-sized sizes, is the latest development in the Timken Company's 57 year partnership with the auto industry. Because it is smaller, it permits more compact designs. Because it is lighter, it cuts unsprung weight and improves the ride. And because it costs up to 15% less than previous designs, it makes possible tremendous savings. Since their introduction, Timken Moto-Mated bearings have saved auto makers over \$1 mil-

lion in front wheel bearings alone. Helped hold down spiraling manufacturing costs.

New Timken Moto-Mated bearings cost less because they are made in a plant that uses production methods completely new to the bearing industry. Advanced machines guarantee an almost unlimited supply of the new bearings—and at lower cost. And Timken Company engineers are ready to help you adapt new Moto-Mated bearings to rear wheels, pinions, differentials and steering gear. As your use of the new bearings increases, we can pass along our manufacturing economies, thus making possible even greater savings.

Today, as always, Timken tapered roller bearings are your No. 1 bearing value. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".



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MIEN

IN THE NEWS



National Acme Co.—Robert R. Rhodhamel was elected vice-president and general sales manager.

Armco Steel Corp., Armco Div.—**Clyde G. Davies** was appointed vice-president in charge of operations.

General Motors Corp.—**William H. Trenn** has been named director of shareholder relations, succeeding **James A. Morris**, retired.

Ford Div., Ford Motor Co.—**Walter J. Cooper** was named general sales manager, and **M. S. McLaughlin** succeeds him as Western regional sales manager.

Beckman & Whitley, Inc.—**E. William Place** has become manager of the Missile Products Div.

Crucible Steel Co. of America—**J. D. Dickerson** has been named manager—steel production.

Clevite Corp.—**Curtis B. Hoffman** was appointed general manager of the Brush Instruments Div.; **James D. Lightbody**, general manager of the Electronics Components Div.; and **Thomas J. Lynch**, general manager of the Ordnance Div.

Joy Mfg. Co.—**William Zech** has been appointed chief engineer for the Turbo-Dynamics Div.

Borg-Warner Corp., Long Mfg. Div.—**Roy Norton** was appointed director of engineering, and **A. H. Schmal** was named general sales manager.

Standard Pressed Steel Co.—**John J. Wiest** has been named technical director of the locknut department.



E. W. Bliss Co.—John Lindberg has been named manager of the Canton Div.



Twin Coach Co.—L. J. Fageol has been elected board chairman, succeeding F. R. Fageol, retired; and William H. Coleman succeeds the former as company president.

Wheelabrator Corp.—**John G. Farabaugh** has been appointed director of industrial relations.

Republic Steel Corp.—**Tom M. Girdler, Jr.**, has been named manager of the Union Drawn Steel Div., succeeding **D. D. Buchanan**, retired; and **E. L. McReynolds** was appointed divisional assistant manager of sales.

Van Norman Machine Co.—**Paul W. Leming** was appointed executive vice-president.

Diamond T Motor Car Co.—**Clare L. Hitchcock** has become director of market research.

Hyster Co., Tractor Equipment Div.—**Ray M. Ronald** has been named manager.

U. S. Steel Corp.—**Maxwell D. Millard** has been named assistant vice-president—sales, and **Howard B. Maguire** succeeds him as general manager of sales.

Hufford Corp.—**Roland L. Guerin, Jr.**, has been appointed director of special projects.

Aluminum Co. of America—I. W. Wilson was elected chairman of the board, and **Frank L. Magee** was named president.



Barnes-Gibson-Raymond Div., Associated Spring Corp.—George Sessions was appointed marketing manager.

Clark Equipment Co., Automotive Div.—G. A. Limbach has been appointed manager of distributor sales.



Thor Power Tool Co.—**A. V. Moroz** has been appointed electric tool sales manager for the Chicago branch, succeeding **Arthur H. Nelson**, retired.

DeSoto Div., Chrysler Corp.—**Cass V. Miller** has been appointed personnel manager.

Mack Trucks, Inc.—**George E. Engelmenn** was appointed vice-president—administration, and **Charles G. Hofreiter** is now treasurer.

Necrology

Richard H. Grant, 78, retired vice-president in charge of sales for General Motors Corp., died Sept. 24, at New York City.

William J. Haley, 66, former president of Esso Export Corp., died Sept. 25, at Rye, N.Y.

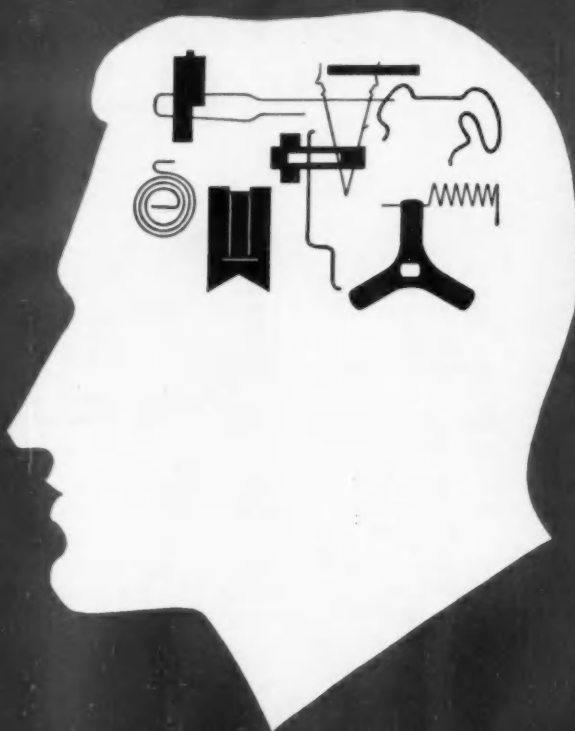
Edward F. Roberts, 82, retired vice-president of the former Packard Motor Car Co., died recently, at Detroit, Mich.

James D. Mooney, 73, former chairman and president of Willys-Overland Motors, Inc., and an ex-vice-president of General Motors Corp., died Sept. 21, at Tucson, Ariz.

John R. Padesky, 62, a vice-president of Electric Auto-Lite Co. and general manager of the La Crosse (Wis.) plant, died recently, at Milwaukee, Wis.

David P. Brannin, 69, retired Western District sales manager for New Jersey Zinc Co., died Sept. 19, at Evanston, Ill.

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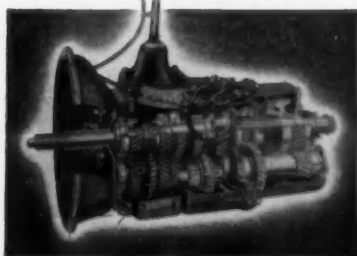
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One of Yule's new C.O.E. International Tractors with Fuller 8-speed ROADRANGER Transmission

YULE eliminates transmission problems with FULLER 8-speed ROADRANGERS®

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Says V. A. Martell, President of Yule Truck Lines, Inc., Milwaukee, Wisconsin: "Fuller ROADRANGERS have eliminated all our transmission problems. We get the kind of gearing we need to take us through any kind of traffic and road condition. After continuous testing under every conceivable condition, the Fuller 8-speed semi-automatic ROADRANGER Transmission thoroughly proved itself. Our drivers say: 'This is it!' and they wouldn't have anything else."

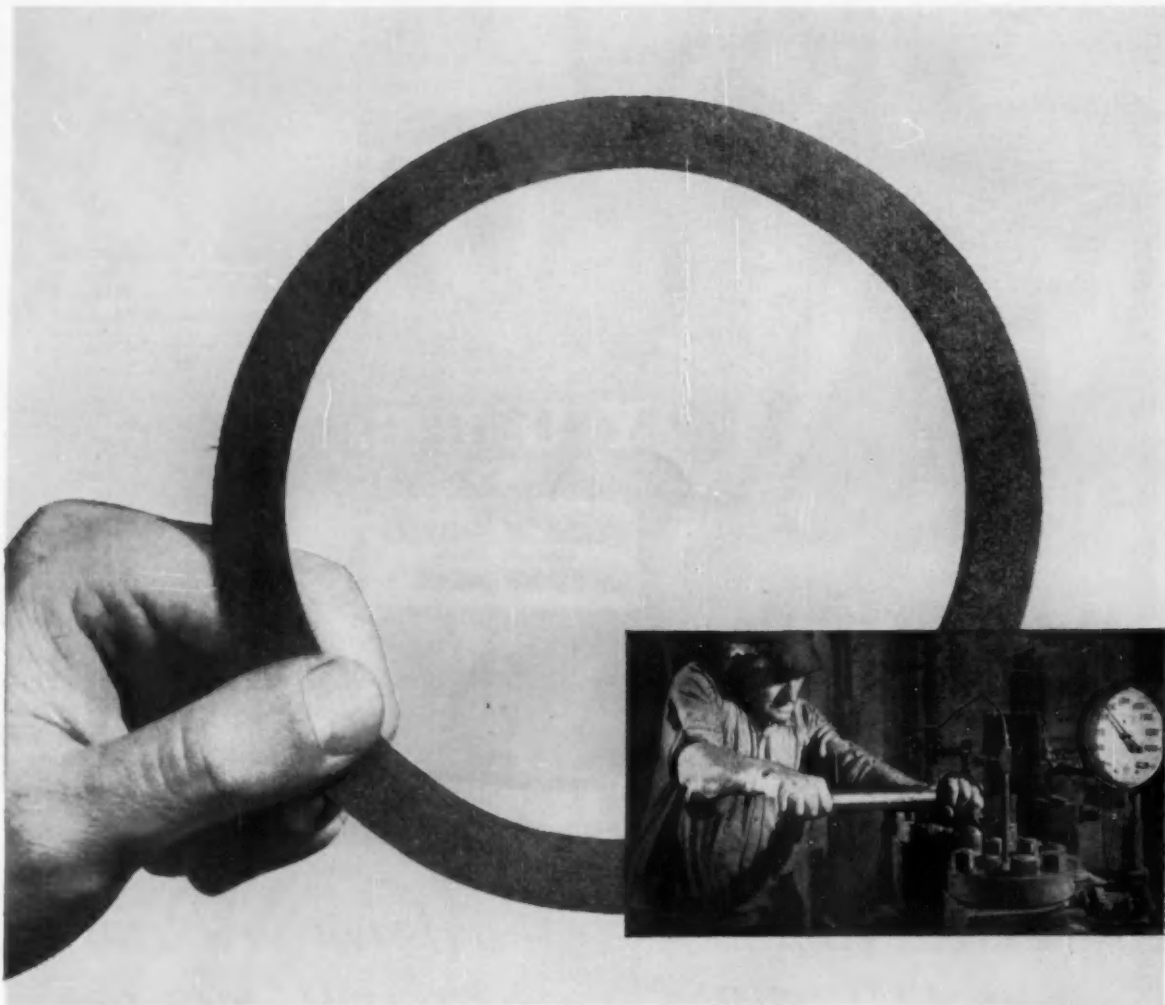
"And," adds E. A. Jenkins, General Manager—Operations: "We will have ROADRANGERS in our future units for sure. For our operation, ROADRANGER Transmissions, C.O.E. tractors and big engines are the answer. Our maintenance superintendent credits the Fuller ROADRANGER Transmission with increased effi-

ciency and with decreased maintenance cost."

Yule's latest fleet additions include 10 International CO-205 Tractors with RD-450 Engines, and 5 International R-195 Tractors with RD-406 Engines . . . all equipped with Fuller 8-speed semi-automatic ROADRANGER Transmissions.

The same outstanding ROADRANGER Transmission advantages . . . low maintenance costs—easier, quicker shifts—higher average road speeds—greater fuel economy—38% steps between ratios keep engines operating in the high rpm range—less driver fatigue—space-and-weight saving economies . . . can be applied to your operation.

For complete details on Fuller ROADRANGERS, see your truck manufacturer or truck dealer now!



Armstrong Accopac N-820 is recommended for heavy-duty applications where flange pressures will be 2000 psi or more and temperatures do not exceed 250° F.

New fiber gasket maintains bolt torque at temperatures up to 250° F.

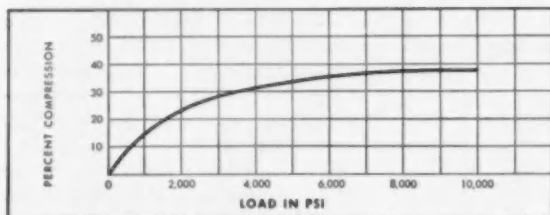
With Armstrong N-820 Accopac®, you can handle sealing jobs at high flange pressures even where temperatures at the gasket line go as high as 250° F.—conditions under which ordinary plant-fiber gaskets would permit serious loss of bolt torque.

Field experience with N-820 Accopac shows that it has

a maximum torque loss of 10-15%. This unusual performance often eliminates the need for re-torquing bolts in order to maintain the desired bolt pressure.

N-820 is made by a patented Armstrong process in which cellulose fibers are beater-saturated with a non-volatile, non-extractable latex binder. The result is a dense, crush-resistant material which has excellent torque-retention characteristics.

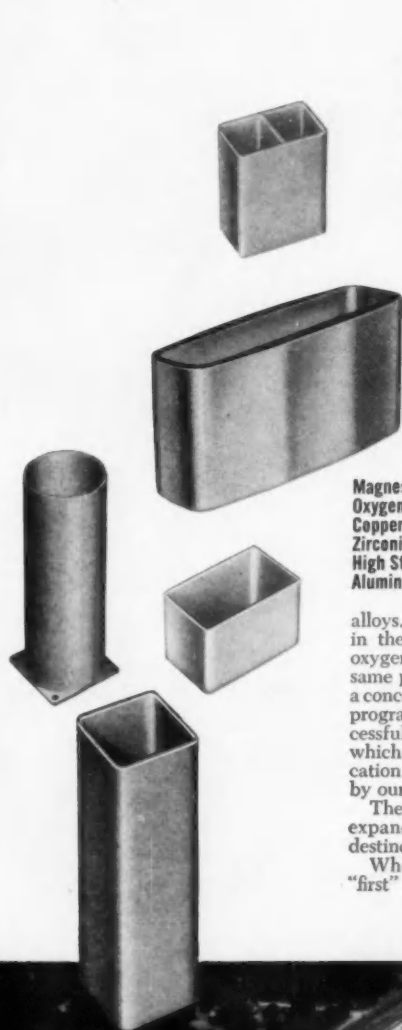
For more information on N-820 Accopac, write Armstrong Cork Company, 7010 Imperial Ave., Lancaster, Penna.



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Breaking fabrication barriers in new materials with cold forging!



**Magnesium,
Oxygen-free
Copper,
Zirconium,
High Strength
Aluminum Alloys**

Most companies and engineering personnel are well acquainted with Hunter Douglas' activities in the field of cold forging aluminum and aluminum alloys. Not so well known are our efforts in the production of magnesium and oxygen-free copper components by the same process. Recently, as the result of a concentrated Hunter Douglas research program, tubular zirconium was successfully cold-forged... an achievement which now opens the door to the fabrication of other rare and costly metals by our cold forging techniques.

The field of cold forging is constantly expanding with many new successes destined for the future.

Where stakes are high and being "first" assures a competitive advantage

—in lower cost, better design, greater strength—an original approach to your fabrication problem will pay dividends.

Hunter Douglas cold forging techniques, backed by an unmatched experience in this field, frequently supply the missing key. Many fabrication problems can be solved simultaneously by producing hollow, dense, zero-draft components meeting exact part geometry requirements and difficult performance specifications.

If you have production requirements in any of the metals now being regularly cold forged, we welcome the opportunity of reviewing prints and submitting quotations. Especially important, if you have an advanced program involving zirconium or other rare metals, we are in position to devote development facilities to the solution of specific high priority problems.



Among Hunter Douglas' many achievements is the first successful cold forging technique for zirconium... a metal long believed unresponsive to this process!

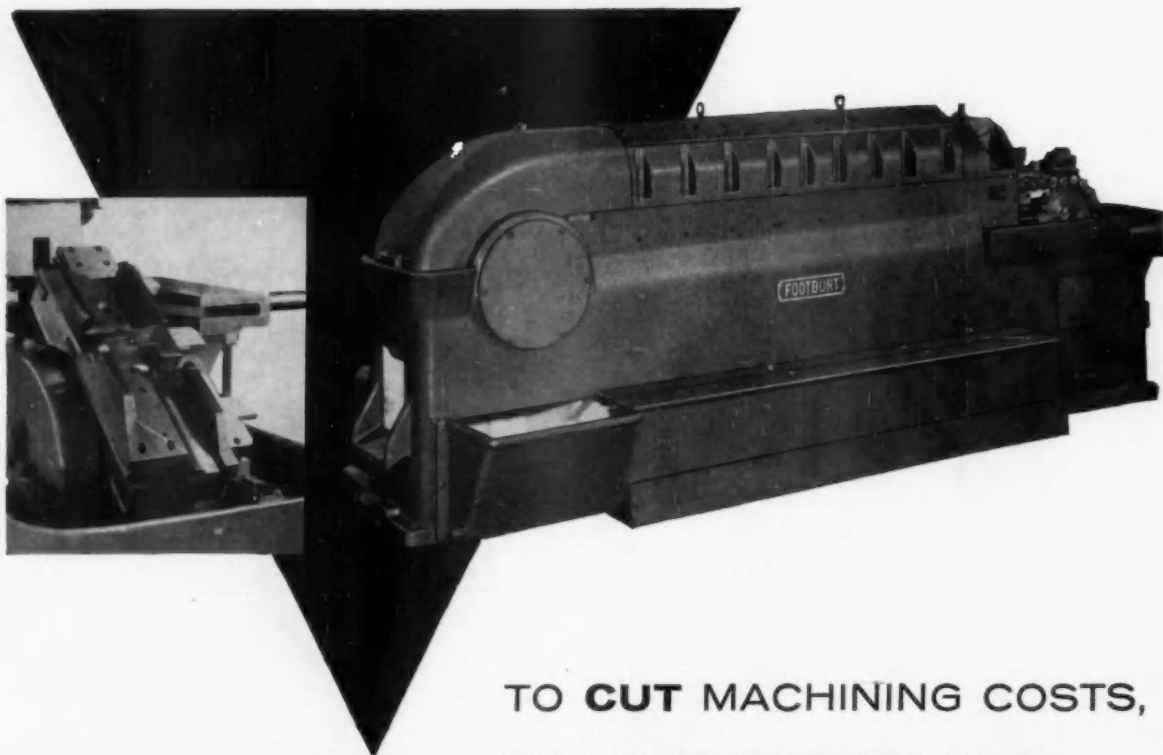
By cold forging, the hard surface oxides, carbides and nitrides normally produced by hot working were completely absent, surface finish was good, and in tubular shapes tolerances on diameters and concentricity were held to a few thousandths... far superior to hot extrusions. With almost complete elimination of machining, metal waste was negligible... an extremely important factor with material costs running as high as \$20.00 per pound!

Cold forging of oxygen-free copper is now proving important to the electronics industry and experimental development work is in progress on magnesium and even common metals, such as steel. Out of this extensive research program is coming the vital knowledge for meeting tomorrow's unusual problems. Look to Hunter Douglas for everything new in cold forging!

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Specialized Handling Equipment for Chassis Frame Assembly at Budd Co. Plant

By Charles A. Weinert

SPECIALIZED handling equipment, designed and built by The Budd Co., marks the Chrysler chassis frame assembly line operation at Budd's Red Lion Plant in Philadelphia. Thorough planning, tooling and workmanship are combined to make an operation which is outstanding in efficiency. The operation comprises three similar lines, one being for Plymouth, another for Chrysler and DeSoto, and the third (and smaller) for convertible X-member chassis frames. The Plymouth line will be described in this article since it is typical of the three setups. Current production output of this one line averages 90 assembled frames per hour.

Before proceeding with a description of the assembly procedures, it is pertinent to mention the make-up of the complete Plymouth chassis frame assembly (Fig. 1). It consists basically of two sets of formed channel-section side rails welded together top and bottom to form two box sections, and five cross members. Side rails are 0.093 to 0.110 in. commercial frame stock. Other frame components include upper control arm bracket, radiator support, outriggers for body mounting, bumper mounting, shock absorber mounting, rear spring front and rear shackle mounting, and torsion bar mounting.

At this point it will also be of interest to mention briefly two workpiece operations which typify the high-volume fabricating methods employed in the Budd plant in supplying parts to the assembly line.

A Natco Holeunit machine (Fig. 2) precision drills and reams two holes in the front engine support to accommodate the torsion bar mounting. Output of this machine is 750 to 800 parts per eight-hour day. The Michigan Drill Head Co. multi-spindle machine (Fig. 3) precision drills and taps four holes in the upper control arm bracket. Equipped with an indexing table, it produces 1000 pair (right and left-hand) of Plymouth parts per eight-hour day.

The sequence of major assembly operations on the Plymouth chassis frame line follows. Parenthetically, we wish to explain that emphasis will be placed here upon the principal operations and especially the work-positioning methods—rather than upon a detailed account of every weld operation. To assist in a better understanding of the work-positioning and handling, a condensed schematic illustration of the line has been prepared (Fig. 4).

Major Assembly Operations:

1. The inner chassis rails, rear engine support (No. 3 cross member), and No. 4 cross member are mounted on a sub-frame jig (with the top of frame in upper position), and joined together in the initial frame assembly operation (Fig. 5).

2. In the next station, front cross member No. 1 is welded in.

3. Main jig station (Fig. 6): Outer rail assemblies (including outriggers) are fed by conveyor to meet the inner rail sub-assembly. The three assemblies are

Fig. 1—Completed Plymouth chassis frame. Note five cross members, side rail construction made up of two sets of formed channel sections joined top and bottom to form box sections, and numerous brackets.

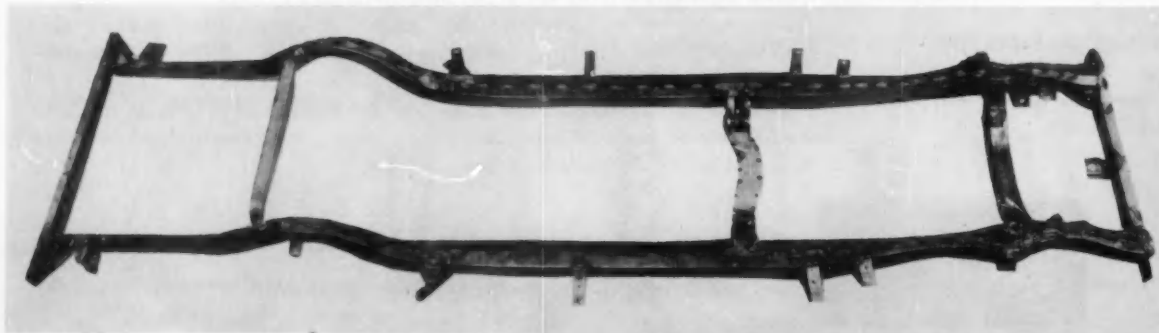




Fig. 2—Typifying piece operations is this Natco machine which drills and reams two holes to close tolerances in the front engine support for torsion bar mounting. Production rate is 750 to 800 pieces per eight-hour day.

joined (top side of frame still up); and rear cross member No. 5 and front shock absorber mounting cans added.

4. In the second main jig station other top welds and bumper brackets are added.

5. The assembly is then transferred to an S-turn-over (Fig. 7) which reverses the frame from top to bottom side up and drops it on the following station.

6. In the first up-side-down jig, upper control arm brackets are added and welding of bottom sides of rails is started.

7. In the second up-side-down jig, the front motor support (No. 2 cross member) is attached. Welds on bottoms of the side rails continue.

Up to this point in the line it is to be noted that the chassis frame moves crosswise of the line.

8. A turnaround transfer car (Fig. 8) automatically turns each frame one-quarter turn and transfers it to positioning lengthwise of the conveyor line.

9. Additional bottom-side welds are made, completing the welding work on the line.

10. Inspection station then checks for soundness

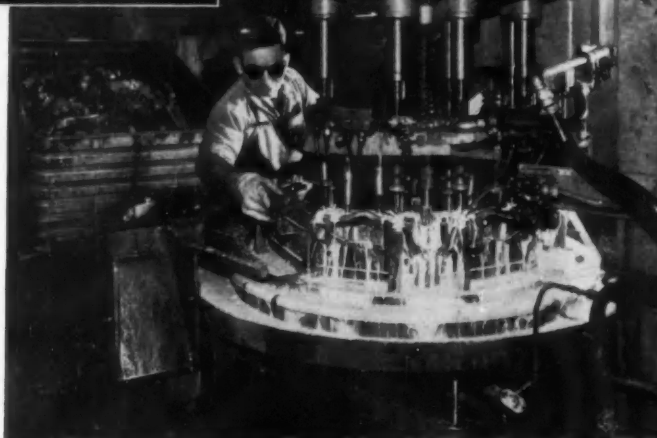
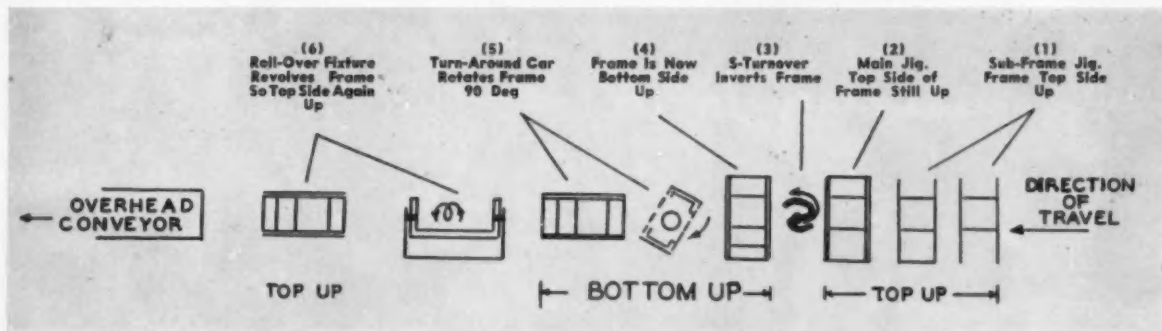
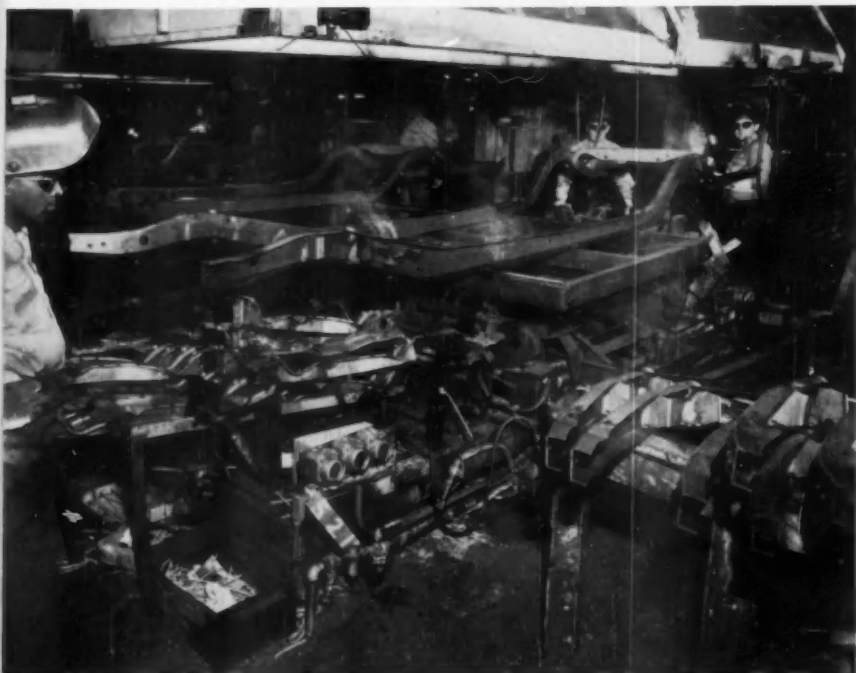


Fig. 3—Michigan Drill Head Co. multi-spindle drilling and tapping machine, equipped with an indexing table, processes four holes in Plymouth upper control arm bracket. Close-tolerance output is 1000 pair (right and left-hand) per eight-hour day.

and accomplishment of all welds. (This is not the first inspection station, a number of them being interspersed among the preceding stations to insure quality control.) *(Continued on next page)*

Fig. 4—This schematic of chassis frame line in condensed form shows top and bottom frame positioning, as well as transfer from crosswise to lengthwise frame positioning, as assembly work progresses—(reading right to left in illustration).



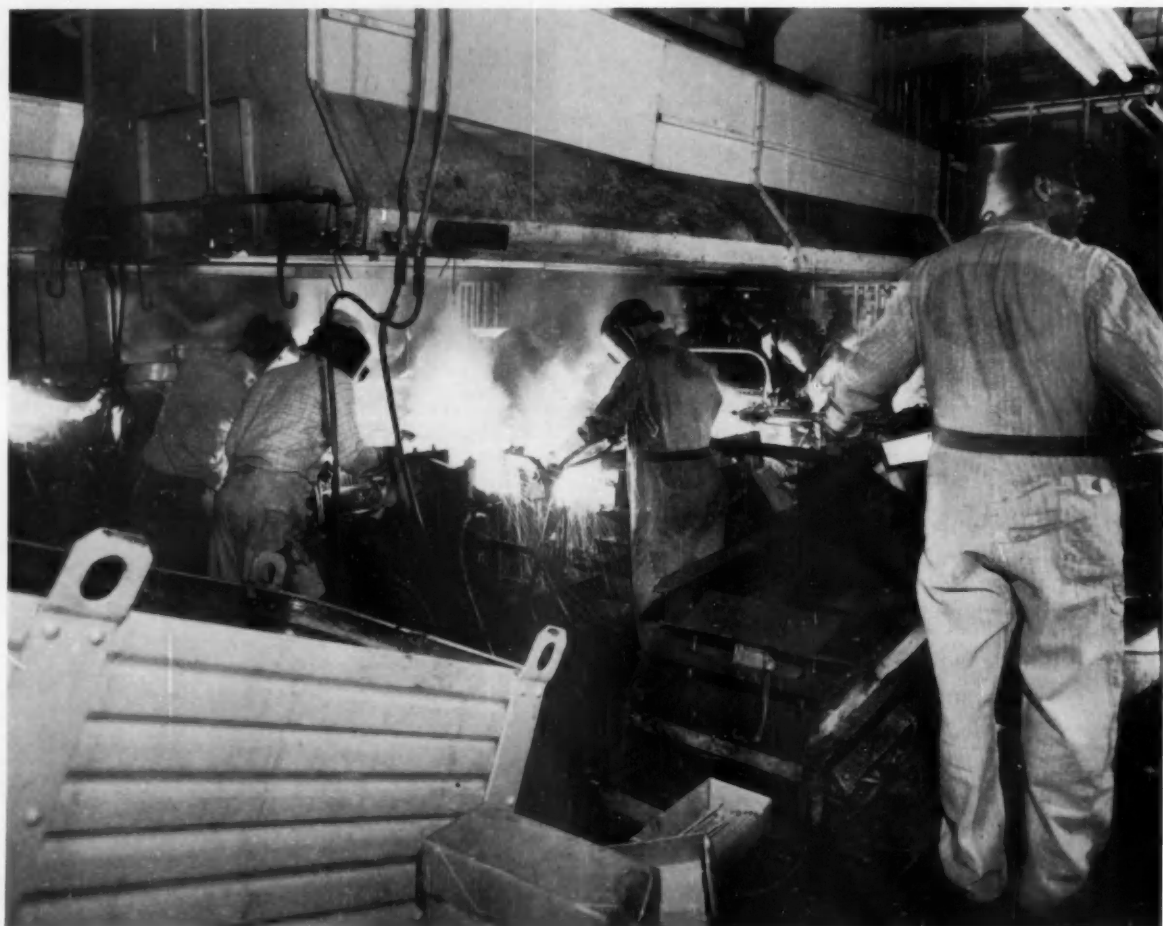


11. Pick-up weld operations are performed after inspection.

12. Rollover (Fig. 9) turns chas-

Fig. 5—First assembly station, where inner rails and Nos. 3 and 4 cross members are mounted in sub-frame jig and joined. Hydraulically-operated table sequence is lower, clamp, unclamp and eject, using a scissors type mechanism. Four sets of pushbuttons, one at each corner, must all be depressed before table operation occurs—a safety measure.

Fig. 6—First main jig station where outer rails are joined to inner frame sub-assembly. Outer rails are fed by conveyor to meet inner rail sub-assembly. Outer rails are placed upon, and dropped into position from, support rails each side of jig. The scissors table lowers inner frame sub-assembly to jig position. Rear cross member No. 5 and shock absorber cans are also attached. With hydraulic lift at four points, the same method of clamping, unclamping and ejection is utilized as in the sub-frame jig operation.



sis frame from bottom to top side.

13. Final inspection.

14. Grind upper control arm bracket faces.

15. Off line to extensive overhead conveyor system.

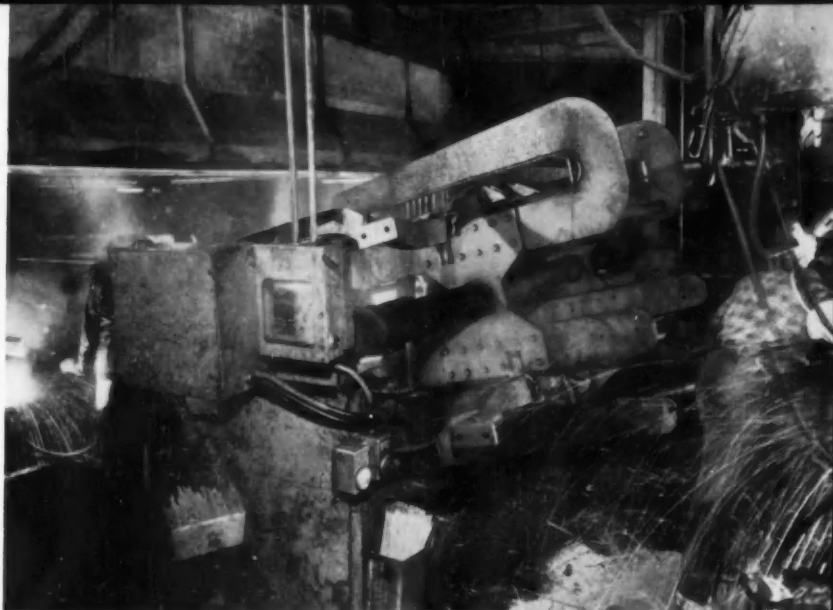
16. Overhead conveyor through wash, dry, paint and bake (frames are on system for a two-hour period); then directly into railroad cars for shipment.

All in all, there are a total of about 250 welds per chassis frame, some as long as eight inches. Each man on the line is assigned four to eight inches of weld, the quantity and length depending upon location in frame. A number is given each weld for checking-out purposes. Work stations total 42. All welding is arc type, employing General Electric and A. O. Smith equipment.

Transfer equipment is mostly electrically-controlled, hydraulically-operated. A unique light system signals the movement of transfer operations from one station to the next, giving a quick visual indication of the proper functioning of each component in the line.

Top—

Fig. 7—S-turnover transfers chassis frame from top to bottom side up. It takes frame from prior welding station, and turns 180 deg on a 30-sec automatic cycle, placing frame in upper section of "S" ready for bar release and gravity drop into succeeding welding station. This device is electrically controlled and actuated. Safety push-buttons are provided for manual operation when desired.



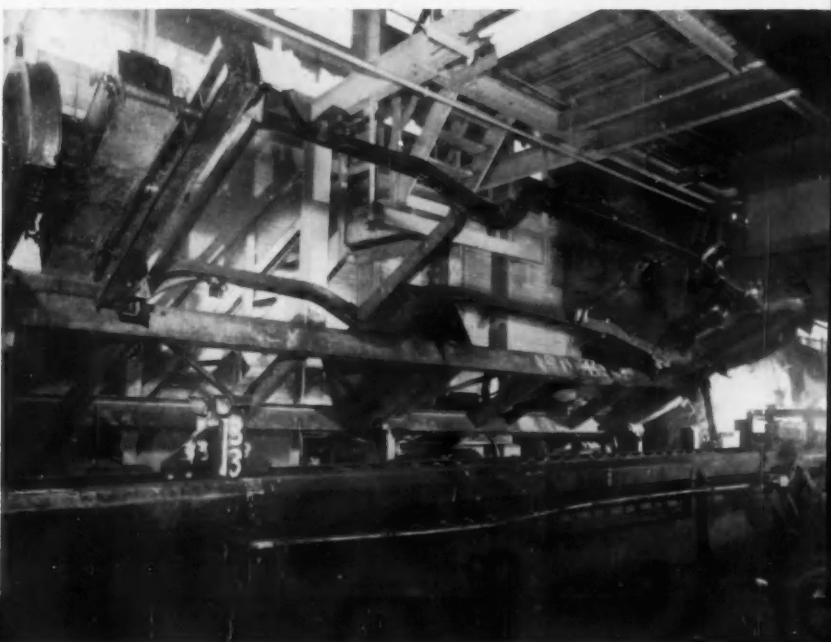
Middle—

Fig. 8—Turn-around transfer car made by Overhead Conveyor Co. changes frames from crosswise to lengthwise of line. Pusher station at end of forward conveyor line raises and places frame on car. Transfer car turns 90 deg; table moves on self-contained wheels; and lowerator on following conveyor line lowers frame on conveyor saddles.



Bottom—

Fig. 9 — Rollover transfers chassis frame from bottom to top side prior to final inspection. Trunnion-mounted, its frame is hydraulically operated. Side members spread and clamp frame for raising; electric motor chain drive turns it 180 deg in raised position, controlled by limit switches; frame is brought down and when on conveyor, limit switches release clamping. Two coil springs are provided to take up shock of lowering.



New Mechanical Features of Chrysler Corporation Cars

for '58

CHRYSLER CORP. offers in 1958 some outstanding mechanical features which are available on the cars being produced by its four passenger car divisions. Among these are: fuel injection; the Sure-Grip differential; and constant control power steering.

The power steering gear embodies the Chrysler principle of full time operation. The mechanism now is housed entirely below the floor board; has fewer parts; less parking effort; and is said to have a better

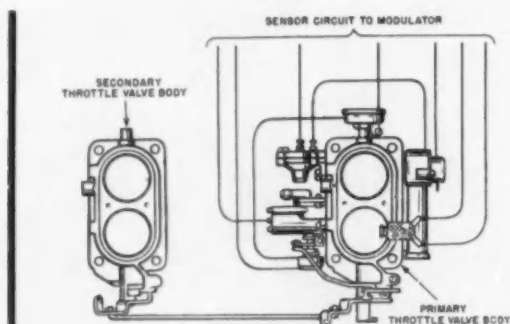
sensing of road feel. The entire control unit is located along the axis of the steering column. The worm shaft is encased by two recirculating ball circuits, gearing it to the power piston. It has a slight freedom of movement vertically by means of a sliding coupling which connects with the steering column.

The outside of the power piston has integral gear teeth, mashing with the cross shaft sector gear to translate the movement of the power piston into rotation of the cross shaft. Flow of oil to one side of the piston or the other, depending upon the movement of the steering wheel, is controlled by a spool valve. The spool valve, in turn, is linked to axial movements of the worm shaft by the valve actuating lever and the center thrust bearing race.

Hydraulic fluid is supplied to the system by a new slipper-type, constant displacement pump, bracket-mounted to the engine water pump housing and contained entirely within the oil reservoir. It is quieter, said to be more efficient, and requires less power for its operation. Flow is restricted to about two gallons per minute by means of a flow control valve. Maximum oil pressure is limited to 850-950 psi by the pressure valve.

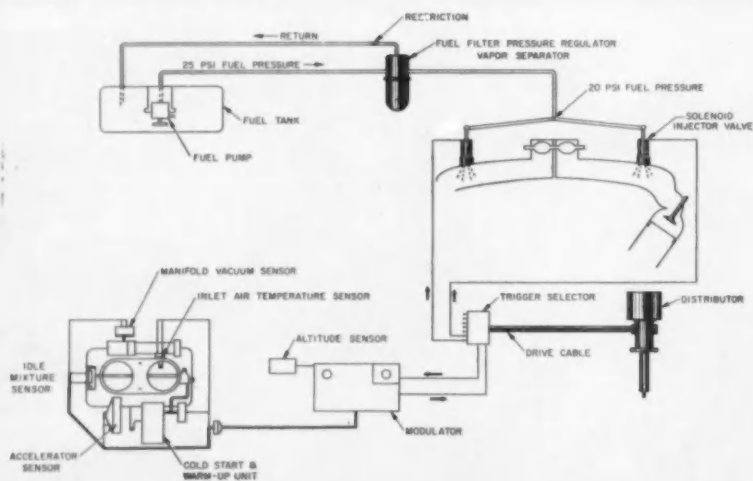
The Sure-Grip differential is a version of the familiar limited-slip unit which has been employed in the industry for several years.

The fuel injection system, an adaptation of the Bendix electronic control system, is optional on all Dodge and Plymouth models; and is available as optional equipment only on the Adventurer in the



**Sensor system
of the new
fuel injection
system**

**Injection timing
and injector
actuating
elements of the
fuel injection
system**



DeSoto line and the Chrysler 300D in the Chrysler line.

The Bendix system, as is known, supplies fuel at constant pressure metered into the cylinders by electrically-operated injector valves. Air is supplied through two throttle bodies. The primary throttle is used initially only to give a softer pedal and better low-speed control; the secondary throttle is used only during fast acceleration.

The fuel injection system is composed of three major components: the fuel supply system, injector control system, and sensor system to regulate injector control. The fuel supply system has a fuel pump that is completely submerged in the tank; a pressure regulator-filter to remove air and vapor and to regulate fuel into the manifold at constant pressure; a manifold to distribute fuel to each injector; and an injector at each cylinder. Each injector valve is solenoid-operated and activated by an electrical impulse from the injector control system. The valve is designed to stay open from 1 to 4.3 milliseconds. As a valve disk is pulled away from its seat electromagnetically, it exposes six small orifices to the pressurized fuel line.

Injector control is designed to regulate the amount of fuel required to give the desired engine performance under operating conditions at the time. This is accomplished by distributing to each injector an electrical impulse timed by a trigger selector, the duration being controlled electronically by a modulator and a complex of sensors.

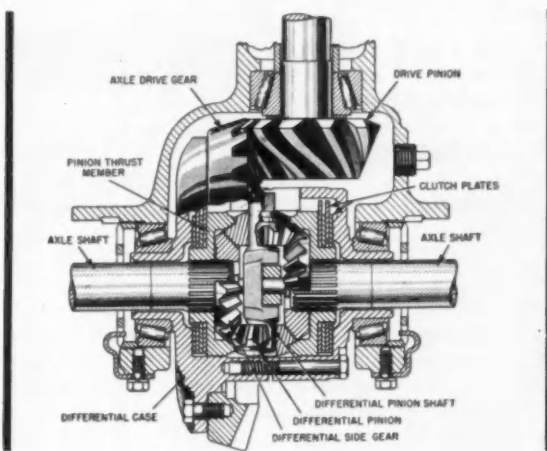
Triggering action is similar to the action of the ignition distributor, the selector being driven at the same speed as the distributor by a flexible cable from the distributor shaft. A four-lobed cam operates two sets of breaker points to permit one of two modulator channels to be triggered.

The modulator, mounted in front of the radiator, develops electronically pulses of current whose duration is calibrated in accordance with ambient atmospheric conditions and engine operating conditions. Each pulse actuates an injector valve, holding it open for the proper length of time. The modulator has two electronic channels, each of which regulates fuel supply to a separate bank of four cylinders.

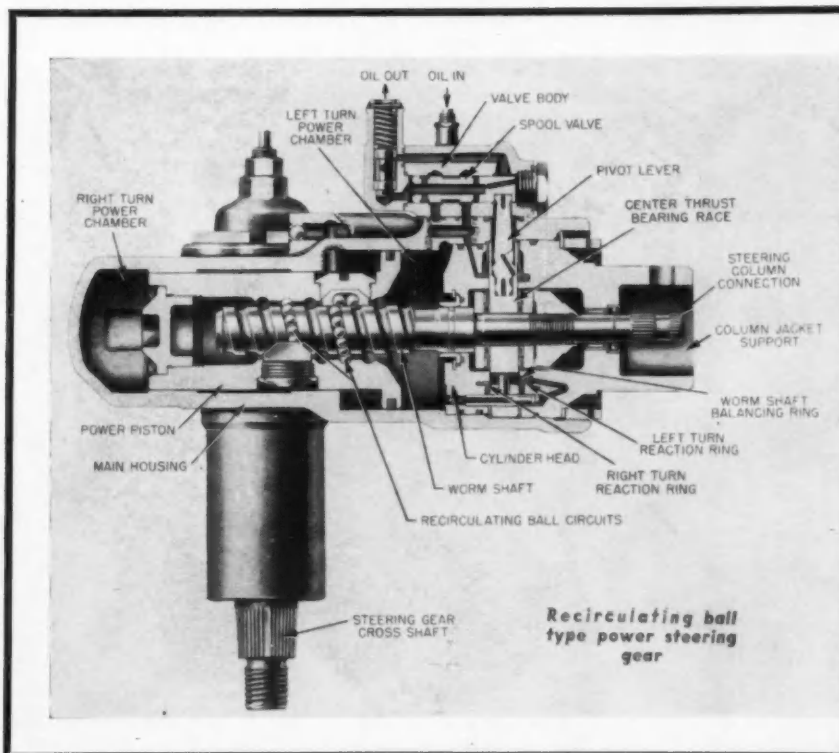
In the sensor system, the basic sensor is the trigger selector. The other sensors, consisting of special resistance units affected by atmospheric and engine conditions, merely modify the basic rate of fuel delivery.

The sensor system includes the

following elements: altitude compensator, temperature compensator, manifold vacuum compensator, acceleration compensator, and idle sensor. In addition there is a cold-start and warm-up sensor which adjusts the duration of the electrical pulse to effect fuel enrichment during cold starting and warm-up. It consists of a thermostatic coil at the primary throttle body which positions a rheostat, and a solenoid-operated plunger linked to turn the thermostatic coil an additional amount when the solenoid is energized during starting.



Cross section of the Sure-Grip differential



Recirculating ball type power steering gear

1958 Chevrolet Trucks

**Newly - Designed
348 Cu-In. V-8
Engine Among
Features of
Expanded Line**



1958 Chevrolet Spartan tandem dump truck

CHEVROLET trucks for 1958 will comprise an extensive line of 128 models on a range of 22 different wheelbases. The line-up includes all vehicles available last year, plus 12 new models to round out the line. There will be a new series designation, e.g.

Series 31, 32, 36 and 38 for light duty models; Series 40, 50, 60 for medium-duty; Series 70, 80, 90, and 100 for heavy-duty. Each individual model will have a four-digit designation.

In addition to the 12 new models, Chevrolet has introduced a new

348-cu in. displacement V-8 engine which will be standard equipment on the Series 90 and 100 models.

New models include: six, 2-ton cab-chassis models with a 6-ft cab-to-axle dimension which is advantageous for certain trailer operations; three cab-chassis models in the 60 Series with 124-in. CA dimension, permitting longer bodies, ranging from 16- to 19-ft in length; and three forward-control chassis with van type bodies in 8-, 10-, or 12-ft lengths. The latter three models are designated as "Step Van," fitted with all steel van type bodies. Maximum GVW ratings of these models is 10,000 lb.

GVW ratings of all existing models remain unchanged, except for four models in the light duty Series, now rated 5600 lb. New models fit into the maximum GVW ratings of their respective series, except for model 6703H which has a maximum GVW rating of 19,500 lb.

As illustrated, exterior styling has been changed materially with the introduction of new grilles, hoods, front fenders, and other sheet metal. Dual 5- $\frac{3}{4}$ -in. headlamps, standard on all models, serve to emphasize the new front fender styling.



The new 348 cu-in. Workmaster engine

Five basic engines are available. Of these the 348-cu in. engine is entirely new and with the exception of some items its components are not interchangeable with either the 283- or 322-cu in. engines.

Chief of the many noteworthy design features of this engine are the new cylinder block and head, stemming from the unique combustion chamber configuration. Instead of the usual cavities in the head, the gasket face is flat and with only minor indentations for valves and spark plugs to protect them from damage during service operations. Valve guides are integral with the head.

The combustion chamber now is contained entirely within the cylinder block, formed by machining the top face of each bank at an angle of 16-deg to provide the wedge. This allows more room for the valves, permits the staggering of valves so that exhaust valves are in one line and intake valves in another line, and also makes it possible to use larger valves. Peaked-top pistons, of autothermic aluminum alloy with slipper-type skirts, complete the combustion chamber geometry. The top of the piston is shaped like a shallow in-

verted Vee with one side of the Vee parallel to the flat cylinder head. This portion of the piston forms the squish surface or quench area to provide for maximum turbulence. Net effect of this design is to produce a fully machined combustion chamber. The spark plug is located at the approximate center of the combustion chamber to provide for short flame travel.

Exhaust valves are sodium-cooled, Stellite-faced, and employed in conjunction with replaceable Silchrome valve seat inserts in the cylinder heads. They are also equipped with valve rotators of "Rotocoil" design. Intake valves are aluminum-coated.

Camshaft drive is by means of a roller type chain. Valve springs are equipped with dampers, and hydraulic valve lifters are standard. Pressed steel rocker arms are mounted on individual studs, while push-rods are hollow to provide for lubrication.

Crankshaft, crankpins and main journals are induction-hardened. Crankshaft overlap is 0.724 in. for greater strength and rigidity. Main and connecting rod bearings are of premium heavy duty Moraine 400.

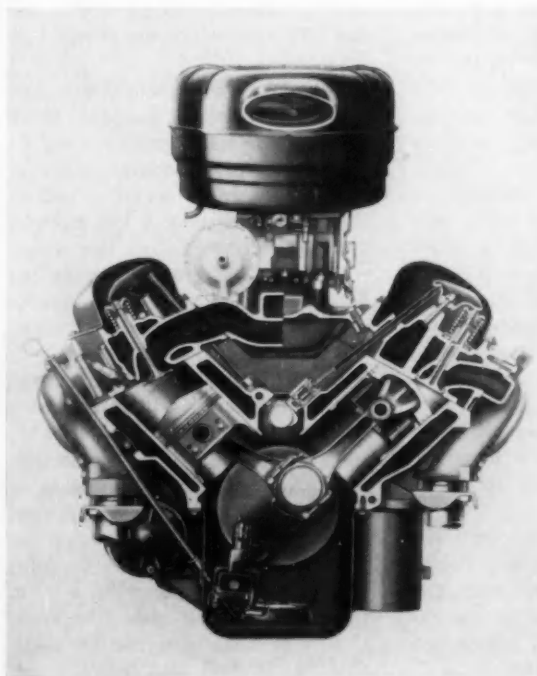
The exhaust manifold has a new configuration somewhat like a wide shallow Vee with an oblong insert at its apex. It provides for maximum breathing through free-flow passage of exhaust gases, restriction and back pressure being minimized by the elimination of sharp bends. A dual exhaust system is provided for the heavy duty engine, mounted directly under the frame side rails for clearance.

The engine has three-point suspension with a single low mount at the front and two mounts at the rear, one on each side of the clutch housing.

Pistons are fitted with a three-ring setup consisting of two compression rings and one oil control ring. A steel insert in the top ring groove reduces wear on the upper side of the groove. The piston pin bearing is located in the piston.

A number of improvements have been incorporated in the six-cylinder engines. The 235-cu in. engine has been improved in many ways and will have a higher rating incident to an increase in compression ratio. Oil to the rocker shaft now is supplied through a drilled hole in the block, eliminating the external oil supply pipe. New oil control rings with stainless steel separators now standard on all Chevrolet truck engines.

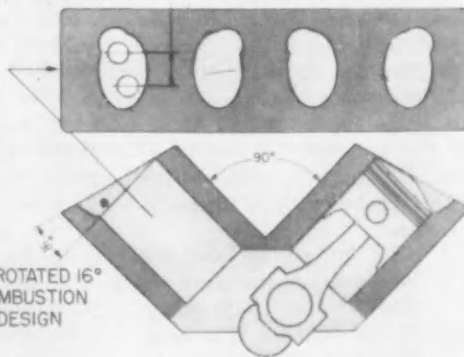
Oil control rings for the 261-cu in. engine have, in addition, chro-



Transverse sectional view of the new 348 cu-in. engine showing design of cylinder block, pistons, etc.

Schematic drawing of engine block geometry, showing elliptical opening at top of bore and pent-roof piston arrangement to form wedge-shaped combustion chamber in 348 cu in. engine

LARGER VALVES STAGGERED
TO TAKE ADVANTAGE OF ELLIPTICAL OPENING



BLOCK FACE ROTATED 16°
FOR NEW COMBUSTION
CHAMBER DESIGN

CONDENSED SPECIFICATIONS OF 1958 CHEVROLET TRUCK ENGINES

	235	235	261	283	283	283	348	322
Type	OHV 6	OHV 6	OHV 6	OHV V-8	OHV V-8	OHV V-8	OHV V-8	OHV V-8
Bore (in.)	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	4.125	4
Stroke (in.)	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	3	3	3	3.25	3 $\frac{1}{8}$
Displacement (cu in.)	235.5	261	261	363	283	283	348	322
Compression Ratio	8.25 to 1	8.0 : 1	8.0 : 1	8.5 to 1	8.5 to 1	8.5 to 1	8 to 1	7.7 to 1
Bhp (max.)	140@4200	180@4000	180@4000	180@4200	180@4200	175@4400	230@4400	195@4000
Torque (lb ft) max.	218@2800	235@2900	235@2900	270@2800	270@2800	275@2400	335@2800	310@2200
Carburetor	1-bbl	Updraft	1-bbl	2-bbl	2-bbl	4-bbl	4-bbl	2-bbl
				Light-duty	Heavy-duty	H-D	H-D	H-D

mium-plated rails. Another improvement is the use of Stellite-faced exhaust valves with welded-on hard tips, used in combination with valve rotators. This engine too has the drilled hole oil supply to the valve rocker shaft.

A light duty 283-cu in. V-8 engine replaces the 265-cu in. engine which is now discontinued. Heavy-duty versions of this engine have Stellite-faced exhaust valves with welded-on hard tips, operating in induction-hardened exhaust valve seats, and used in conjunction with valve rotators. Oil control rings feature chrome plate three times as thick as formerly. This engine too has a roller type timing chain.

A precision vacuum spinner governor is supplied on this engine for both two-and four-barrel carburetor versions.

An important change has been made in the cylinder head to reduce spark plug temperature. It consists of two, 3/16-in. holes drilled on each side of the spark plug boss with water fed from a hole in the top surface of the block. This is said to reduce spark plug gasket temperature as much as 170 F.

Here are some details common to six-cylinder and V-8 engines. A one-piece fan shroud permits a single radiator mounting for engines in the 30, 40, and 60 Series. With the optional V-8 in the 30 Series Chevrolet supplies a fan ring, mounted directly to the radiator frame.

All Series 70, 80, 90, and 100 trucks have dual exhaust systems. The muffler is of reverse-flow, resonance and diffusion type, similar to the passenger car version.

The addition of a second drive range on the Powermatic transmission provides still greater flexibility in downhill speed control and makes the hydraulic retarder available in fifth gear as well. Another improvement is in the adoption of a flexible shaft replacing the linkage between the selector lever and transmission.

To suit the extra power-torque output of the new V-8, Series 90 and 100 models are provided with the Spicer heavy duty five-speed transmission as standard equipment.

Among the electrical system features is the use of a 30-amp generator on Series 30 through 80 to provide for the additional load due to the dual headlamps. Electric windshield wipers are continued as standard in all trucks with V-8 engine; and in the 60 Series with either 6-cyl or V-8 engines. This wiper is an improved two-speed unit, drawing only 2.5 amp.

Coming to chassis features, it is of interest that full air brakes are available as an option on Series 70 through 100 models, with either disk or cast wheels. Full air brakes also are available for tandem axles in both 80 and 100 Series with standard case wheels.

Series 90 and 100 models now have an 18,000-lb rear axle as standard equipment with rear brake drums increased to 16-in. diameter.

New power steering will be available in the 90 and 100 Series with a higher capacity hydraulic pump mounted forward on the engine, driven by belt. A new power cylinder, of 2 $\frac{3}{8}$ -in. diam is used.



Selector quadrant, 1958 Chevrolet Powermatic transmission

An oil-wetted air cleaner mounted under the dash supplies air to the actuating unit of all vacuum-operated two-speed axles.

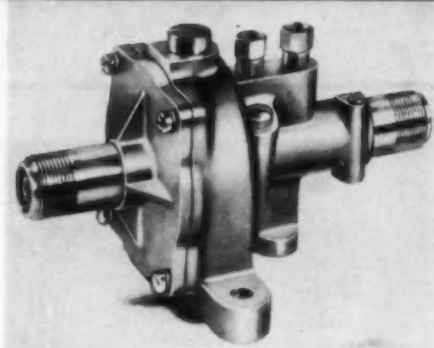
The 9000-lb front axle, formerly available only in tandem models, now is offered for all Series 90 and 100 models, except school bus chassis.

Four-wheel drive trucks now are available with an optional front driving axle with greater durability, better fuel economy, improved handling and steering control. Equipped with unique locking and unlocking type hubs, the front wheels can be free to rotate independently of the axle shafts when operating on normal highways.

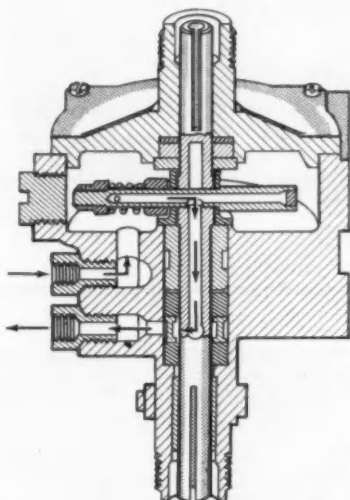
In light duty models hydrovac power brake units will be available as RPO equipment on forward-control models and Series 38 models only. It is also available as a dealer installed accessory on Series 31, 32, 36 and 38.

Tubless tires are standard equipment on all models, with a wide range of optional sizes. In addition, tube type tires will be available as optional equipment.

Details of the Holley Road Speed Governor



Here is the exterior view of the road speed governor valve, showing the ease of installation in any convenient location.



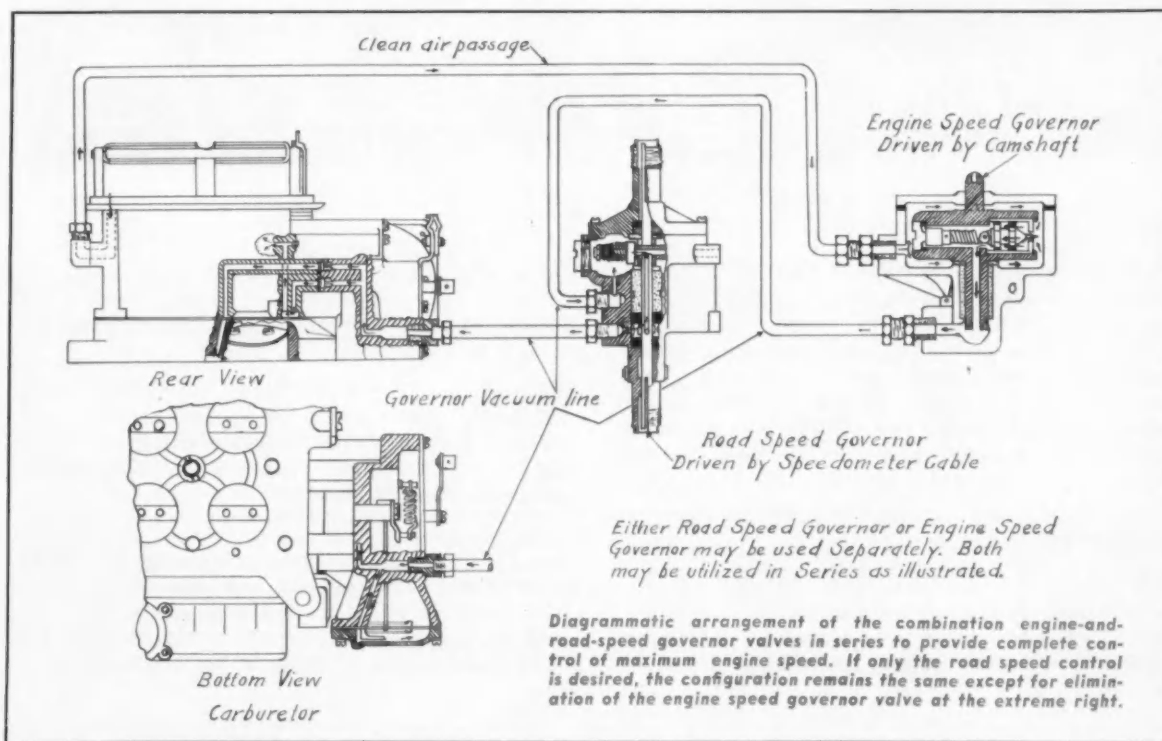
Cross-sectional view of the new road speed governor valve, showing the transmission cable connection at the bottom and connection to the speedometer at the top. The rotor with weight and control spring may be seen in the lateral cavity. Arrows show the flow of air to the rotor cavity and out of the cavity to the governor diaphragm.

HOLLEY CARBURETOR CO. now has available a sensitive and accurate governor system for any range of maximum road speed desired by the fleet operator or truck owner. The road speed governor valve, driven by the speedometer cable from the transmission, combines centrifugal speed control with vacuum actuation of the diaphragm which controls the governor throttle. This

follows the general pattern of Holley governor configurations—the earlier Centri-Vac governor; the engine governor control valve, introduced several years ago; and the Rotovance distributor-governor package in current use.

Because the road speed governor controls maximum vehicle speed only, Holley is prepared to supply a more complete package that will also control the higher range of engine speed when going through the gears or operating in low gear. This is done by means of the existing engine-driven governor control

(Turn to page 126, please)





Studebaker two-door sedan, six-cylinder



Studebaker President four-door sedan

Studebaker Sedans and

Station Wagons for 1958

FOR its 1958 line of Studebaker sedans and station wagons Studebaker-Packard will offer the following models: *Scotsman Series*: 2-door sedan, 4-door sedan, 2-door station wagon; *Champion Series*: 2- and 4-door sedans; *Commander Series*: 4-door sedan, 4-door station wagon (Provincial); *President Series*: 4-door sedan; *Hawk Series*: Silver Hawk (6-cyl), Silver Hawk (V-8), and Golden Hawk. The new Packard Hawk also is announced.

Dual headlamps are standard on Commander and President series, optional on Champion. They are not available on the Scotsman or sports-type Hawks.

The engine line-up may be described as follows: the 185-cu in., 6-cyl engine is standard on Scotsman, Champion, and Silver Hawk Six models. The 259-

cu in. OHV V-8 is standard on the Commander. The 289-cu in. OHV V-8 is standard on the President and Silver Hawk V-8; the same engine with supercharger is used in the Golden Hawk.

Wheel sizes are varied with the models: 14-in. wheels are standard on all V-8-equipped models; 15-in. wheels are standard on Champion and Silver Hawk Six, with 14-in. wheels optional; only 15-in. wheels are available on the Scotsman.

Transmission options are as follows: the conventional synchromesh transmission is standard on Champion, Commander, President, and both Silver Hawks, with overdrive or automatic transmissions offered as optional equipment. Overdrive is standard on the Golden Hawk, with an option of the automatic drive.

**Gear Ratios Specified for Each Car Model
and Transmission Type**

Series	Standard	Overdrive	Automatic
Scotsman	3.54	3.54
Champion	4.10	4.56	3.54
Silver Hawk Six	4.10	4.56	3.54
Commander	3.54	3.73	3.31
President	3.54	3.92	3.31
Silver Hawk V-8	3.54	3.92	3.31
Golden Hawk		4.09	3.31
Packard Hawk		4.09	3.31



The Studebaker Golden Hawk, supercharged V-8



The supercharged V-8 Packard Hawk

Automatic drive is standard equipment on the Packard sports coupe, with overdrive optional.

Roof height has been lowered in varying amounts on the different models by changing roof panels, steering knuckles, spring camber height, and wheel sizes. Seat cushions in all sedan models have been lowered one inch to maintain headroom. Leg room for rear seat passengers has been improved by changing the configuration of the floor pan.

Studebaker has abandoned the two-piece drive shaft used last year and will use an improved one-piece propeller shaft. This has been accomplished by the use of long transmission extensions, moving the front universal joint toward the rear.

The floor pan tunnel has been lowered from the zero-point under the front seat to a point under rear

seat which is $2\frac{1}{8}$ in. lower than in 1957. This has made it possible to supply a one-piece rear seat for Hawk models.

Rear spring configuration has been radically altered. Although the rear axle center remains the same, the front spring eye is moved aft by four inches, while the rear eye is moved aft by eight inches. Thus the rear springs are four inches longer and eccentrically loaded since the rear axle center now is six inches ahead of the rear spring center. This is said to result in controlling axle rotation and propeller shaft vertical movement as well as in improvement in the ride.

In addition to the models described above, two completely new models will be introduced into the Studebaker line next November—a 2-door hardtop in both the President and Commander series.

Automatic Production of Bearing Cups

from Tubing to Finished Parts

By Charles A. Weinert

MANY of the unique features and facilities of The Timken Roller Bearing Company's Bucyrus, Ohio, plant were described in a recent issue of *AUTOMOTIVE INDUSTRIES* (October 1, page 48). This second part gives further details, concerned with the facilities for tapered roller bearing *cup* production.

As mentioned previously, there are five lines in the cup production setup. The layout of the cup lines closely resembles the cone layout illustrated in the prior issue. Methods of product handling also are similar, with all parts being mechanically conveyed between operations and all work operations being performed automatically. If anything, the cup

lines are even more automatic in operation, the only parts touched by human hand being those taken for random inspection. While the cup lines are generally similar to the cone lines in overall layout, there are nevertheless a number of variations in equipment and processing to suit the characteristics of the different pieces involved.

The basic sequence of work operations on the cups follows: (1) green machining, (2) chamfering and stamping, (3) heat treating, (4) face grinding, (5) OD grinding, (6) ID grinding, (7) ID honing, (8) gaging and inspection, (9) washing, drying and slushing, and (10) wrapping and boxing.



Batteries of National Acme single-spindle screw automatics green-machine cups from seamless steel tubing on cup lines Nos. 1, 2 and 3. Carbide tools, in rapid sequence, form the OD, bore and tapered raceway, and cut off the ring-shaped parts to desired length, in preparation for subsequent finishing operations.

Green Machining

Green machining of the cups from seamless tubing is handled by five batteries of single-spindle screw machines. Eight 2-in. and twelve 3 $\frac{1}{8}$ -in. National Acme, and fourteen 4 $\frac{5}{8}$ -in. New Britain machines are used in this operation. The stock racks which feed these units are of Timken design, and provide a quick means of semi-automatically loading the machines. When a new piece of tubing is pushed home in a machine by this loading device, chucking of the hot-rolled seamless is automatic, with no hand chucking or collet adjustment being necessary.

Chamfering

Green machined cups go from the screw machines to washers, up elevators to storage bins, and thence through rotary feeders, cup turnovers and chutes to the chamfering and stamping machines. The machines which chamfer the cup bores are of special Timken design. Those which stamp, or mark, product identification on the OD's of the cups are of George T. Schmidt, Inc. manufacture. There are five of each.

Heat Treatment

From the chamfer and stamp operations, the pieces are conveyed to bulk storage bins which feed the heat treating equipment. Four groups of through-flow carburizing, hardening and tempering furnaces, developed specially by Surface Combustion Co. and Timken, are in the cup production setup. The methods of operation and results obtained with this equipment were detailed in the prior portion of this article. There are, however, two types of hardening furnaces used here. For smaller parts that do not distort excessively, a spiral retort of small dimensions was designed. For the larger parts which tend to distort more, a continuous pusher furnace was developed with an automatic plug-quench. In the latter case, the quenching machine was of completely new design. Operated hydraulically, it automatically handles four cups at a time, with quench cycles varying from 13 to 35 sec depending upon cup size.

Face and OD Grinding

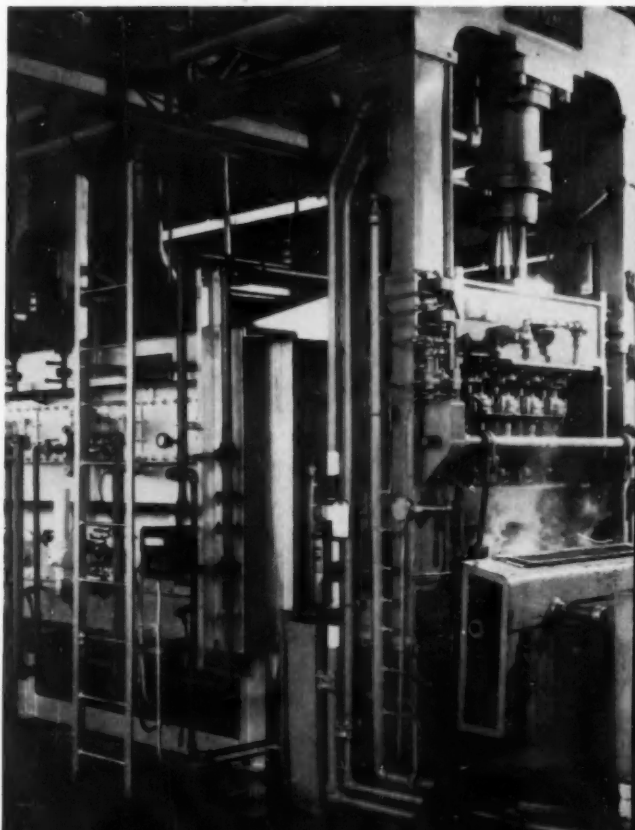
After heat treatment, the cups are conveyed to Gardner double wheel grinders for face grinding. One of these grinders is in each of the lines and has a production capacity more than adequate to supply the demands of the subsequent operations.

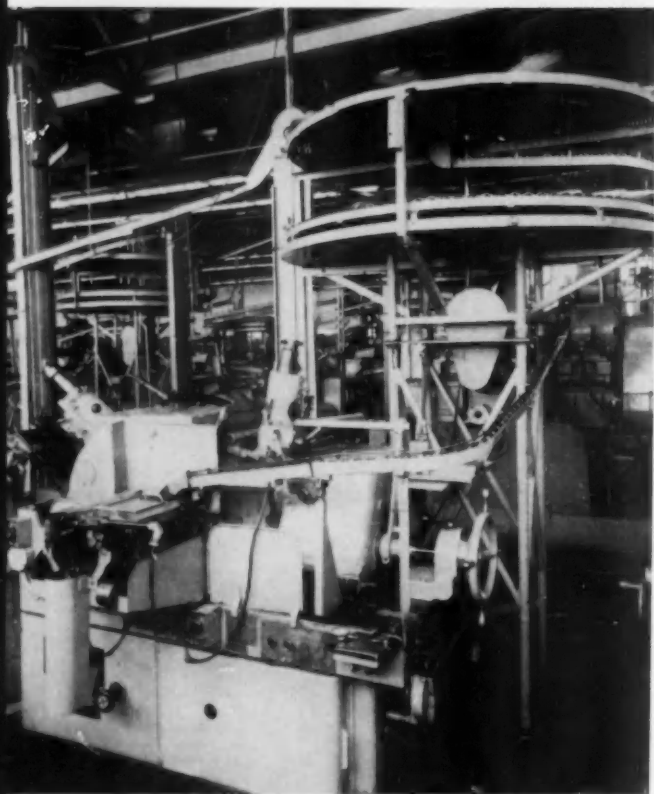
The next operation is OD-grinding of the workpieces. This is handled by batteries of Cincinnati

Cups on lines 2, 3, 4 and 5 are plug-hardened to maintain a uniform ID size and to minimize out-of-roundness. This is done on the special design, automatically-operated, hydraulic quenching machine pictured. It handles four cups at a time, and quench cycles vary with size of cup from 13 to 35 sec.



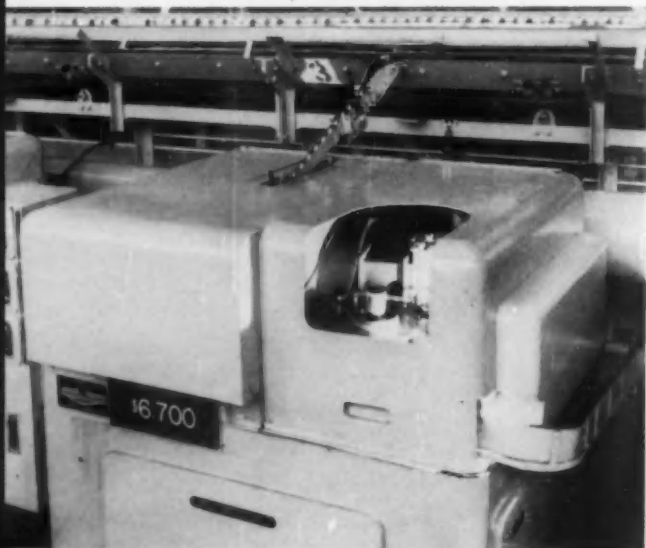
Illustrative of the mechanical handling of pieces from one operation to another is this system of conveyors in the green-machining department. Green machined cups go from each of the screw machine batteries to a washer, up the elevator to a storage bin, and through a rotary feeder and cup turnover chute to the marking and chamfering machines.





Cincinnati No. 2 centerless grinder finish-grinds OD of cups to a tolerance of 0.001 in., at the rate of about 74 per minute (varying with cup size). The spiral rack above machine feeds cups into machine loader. The feeding mechanism was designed by Timken engineers. The spiral rack also provides a storage bank for steady flow of parts to the machine. Gage mounted on machine gives a quick means of checking cup sizes after this operation.

Timken tape-honing machine finishes the tapered ID raceways of the bearing cup to a six-microinch finish. Depending upon cup size, a cup can be honed in from 8 to 12 sec. This close-up view shows the honing tape reel. In the background is the rotary distributing conveyor and chute feeding this machine.



No. 2 and No. 3 centerless grinders, and consists of one rough and one or two finish-grind passes. Three each of the grinders are used on four of the cup lines; and two on the No. 1 small-size cup line. At these locations a spiral storage rack feeds cups into the loader of each machine, the cups falling into the loader via a gravity chute. Each stroke of the loading mechanism places cups in a horizontal column; and pressure is applied by a system of weights which pushes the cups against the grinding wheel. It has been worked out so the desired predetermined pressure is steadily maintained and so the cups are fed through squarely. In the finish-grind operation, the OD of the cup is ground to a tolerance of 0.001 in. at the rate of about 74 per minute (output varies with the size of the piece).

ID Grinding, Honing

Following the OD-grind, the pieces are transferred to rotary distributing conveyors feeding the ID grinders. One-pass Timken-Heald No. 281 grinders are used in this operation, the number of machines in each line varying from 6 to 14. Here the tapered raceways of the cups are ground to a tolerance of 0.0006 in. on the taper and 0.002 in. on the stand, the cycle of operation being from 12 to 30 seconds per piece depending upon cup size.

Timken tape honing machines then finish the ID raceway to a six-microinch finish. Depending upon size, a cup can be honed in from 8 to 12 sec. These machines use abrasive tape, the tape being advanced for each cup, thus presenting a new and identical surface to each workpiece and giving the product a high uniformity of finish and dimensional quality. Four of the lines have five each of these honing units; the smaller-size-cup line has eight. At the end of each of these honing machine batteries, a Westinghouse Precipitron collects the oil mist from the lines of the tape honers, separating the oil for re-use.

Centralized Utilities

At this point it will be of interest to call attention to the fact that several centralized utility systems were specially designed and built into the Bucyrus facility. A central hydraulic system is provided for internal grinding machines, as well as a central coolant system for all grinding machines and screw machines. There is also a central honing solution system for all the honing machines, and a central supply for high frequency power for internal grinding wheel spindles.

Gaging and Inspection

After the finish-honing operation, the cups are taken by elevator conveyor to be checked on automatic air gages. Here the parts are simultaneously checked for length, OD, taper, and raceway stand, and are automatically rejected or approved. Any

(Turn to page 129, please)

... Trends in the

CONSTRUCTION EQUIPMENT INDUSTRY

By Kenneth Rose

Shipments of Equipment

SHIPMENTS of excavating and earthmoving equipment, except power cranes and shovels, for the second quarter of 1957 have been totaled by the Bureau of the Census as \$227 million in value. This represented a decrease of 1 per cent from the first quarter shipments of \$229 million. Shipments of road construction and maintenance machinery totaled \$57 million, an increase of 14 per cent over the preceding quarter. The value of track-laying tractors shipped decreased from \$119 million to \$105 million in the second quarter, a decline of 12 per cent. Shipments of contractors' off-highway wheeled tractors increased, however, from \$28.6 million in the first quarter to \$34.9 million in the second.

Federal Funds

As of Sept. 1, Federal air funds available to the states for the Interstate Highway System, but not yet committed to projects, totaled more than \$2.5 billion, Federal Highway Administrator Bertram D. Tallamy announced. During the month of August, contracts for about 246 miles of road construction, estimated to cost nearly \$105 million, were advertised for bids. Contracts were awarded for 156 miles of highway construction on the project, at a cost of nearly \$70 million. An additional \$72 million were authorized for surveys and plan preparation, and for acquisition of rights-of-way.

At the beginning of September, 14 months after passage of the Federal-Aid Highway Act, more than \$2.7 billion were scheduled for improvements to the Interstate System, of which nearly \$2.3 billion were Federal Aid funds. Construction contracts under way

or soon to start covered 2151 miles of highway, and totaled more than \$1.1 billion, of which \$982 million were Federal funds.

Expenditures for Highways

THE estimated amount to be paid into the Highway Trust Fund in the next fiscal year totals \$2,185 million, \$115 million more than had been estimated in February of this year. The Treasury Department, however, predicts that expenditures for highway construction during the fiscal year 1958 will be \$1,806 million as compared with an earlier estimate of \$1,900 million. This estimate of new expenditures, while about \$94 million less than the earlier estimate, is still 87 per cent above the \$968 million paid out during fiscal 1957.

Near-Record Construction

CONSTRUCTION of all kinds put in place during the month of July was near the all-time record of \$4.420 billion of July, 1956, when it rose to \$4.403 billion. Many contractors were reported to be disappointed with this showing, having expected the total to be higher.

Highway construction rose slightly during the month of July, but the rise was slightly less than the expected seasonal upturn. Outlays for most types of non-residential building declined during the month. Public utility construction rose about seasonally, and work on military, conservation, and development projects rose more than seasonally. Expenditures for new private housing rose seasonally about 4 per cent.



Mobile supermarket van on Büssig chassis by Carrosseriewerke Aarburg displays up to 900 articles; refrigerators are operated by separate engines

European Vehicle Developments

PRESENTED here are some interesting developments in late model trucks and buses



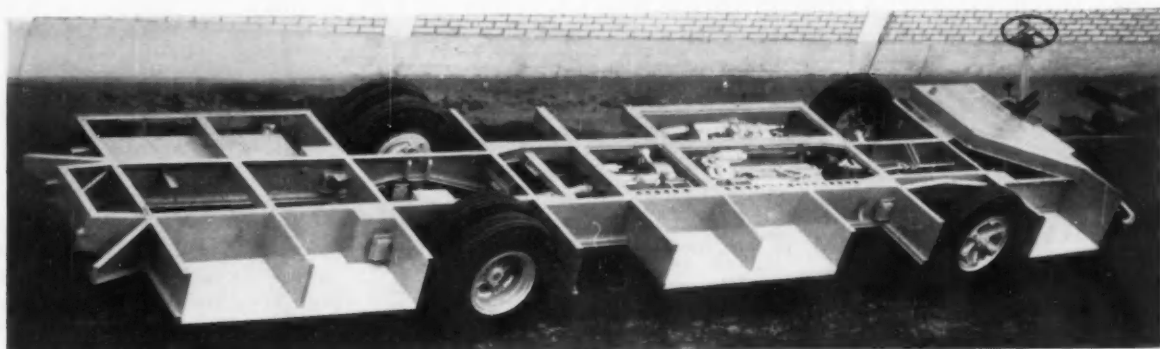
Van Twist three ton truck is a new Dutch vehicle powered by a Perkins Diesel engine



Lancia Beta B190 2½-ton truck has two-cylinder, two-stroke Diesel engine; features five-speed transmission and independent front suspension

Articulated AEC-Verheul bus used by Amsterdam Tramway Co. has length of 57 ft and passenger capacity for 150





New Saurer platform for buses is basic structure for unit body-and-frame vehicles—its supercharged engine said to develop 650 lb ft torque

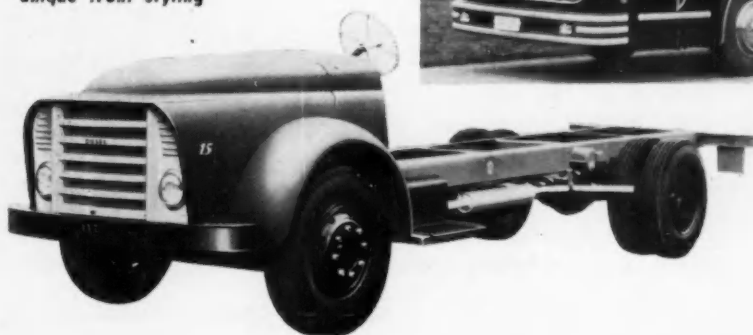


German Ford 4x4 truck has offset front axle drive



Chassis of Mercedes-built Unimog S with four-wheel drive accommodates six-cylinder engine developing 85 hp; coil springs used all around

DAF truck with 105-hp Leyland engine has unique front styling



Gangloff coach on AEC chassis has 36 semi-sleeping chairs, electric kitchen equipment and telephone

American Motors Announces Rambler and Ambassador Models for '58

American Motors' 1958 line of six and eight-cylinder Rambler cars will consist of 11 models — station wagons, sedans and hardtops. Both the V-8, known as the Rambler Rebel, and the six are built on a 108-in. wheelbase.

The new Ambassador V-8s in the Rambler series, with a wheelbase of 117 in., will include a super and custom four-door sedan and four-door station wagon, and a custom four-door hardtop sedan and four-door hardtop station wagon.

A new 100-in. wheelbase series of cars will be announced later this year.

Horsepower of the Rambler engines has been increased. The six overhead valve engine is rated at 127 hp, compared with 125 for the 1957 model. An optional twin throat carburetor boosts the rating to 138 hp. The V-8 develops 215 hp, up from last year's 190. Both engines have increased compression ratios and, in the case of the V-8, a new four-barrel carburetor.

Three transmissions are available in the Rambler and Ambassador: standard synchromesh, optional overdrive and Borg-Warner's Flash-O-Matic, also optional. A feature of the automatic transmission on both Ramblers and Ambassadors is control of internal shifting by engine vacuum rather than a mechanical linkage. Driver control of the transmission is by push buttons.

To prevent body rust, a "body-

ENGINE SPECIFICATIONS

1958 Ambassador V-8

Type	V-8 (90°-V)
Cylinder Arrangement	Overhead Valve
Bore and Stroke	4 in. x 3¼ in.
Displacement	327 cu. in.
Compression Ratio	8.7 : 1
Max. Brake Horsepower	270 @ 4700 rpm
Max. Torque	360 @ 2800 rpm
Type of Carburetor (Downdraft)	Four Barrel (Standard)
No. of Carburetors	One
No. of Main Bearings	Five
Exhaust System	Dual (Standard)
Oil Filter	Full Flow, Std.

Engine Specifications — 1958 Rambler

	6-Cylinder	Rebel V-8
Type	In-Line Six	V-8 (90°-V)
Cylinder Arrangement	Overhead Valve	Overhead Valve
Bore and Stroke	3¼ in. x 4¼ in.	3¼ in. x 3¼ in.
Displacement	195.6 cu. in.	280 cu. in.
Compression Ratio	8.7 : 1	8.7 : 1
Max. Brake Horsepower	127 @ 4200 rpm; 138 @ 4500 rpm (opt.)	215 @ 4300 rpm
Max. Torque	180 @ 1800 rpm; 185 @ 1800 rpm (opt.)	290 @ 2900 rpm
Type of Carburetor (Downdraft)	Single Throat Twin Throat (opt.)	Four Barrel
No. of Carburetors	One	One
No. of Main Bearings	Four	Five
Exhaust System	Single	Dual



Ambassador four-door hardtop sedan

dip" process which completely rust-proofs automobile bodies inside and out is being used on 1958 Ramblers. The dip method, under which the entire car body is submerged in a giant tank containing a rust-preventing primer, is said to be the first used by a U. S. automobile manufacturer.

Backs of the front and rear seats in sedans and hardtops have been reduced in height by two inches and one inch, respectively. Rear-seat back height in station wagon models has been lowered three inches. The rake angle of front seats has been increased to allow a more natural sitting position. Rear seats have been lowered an inch. The front seat adjustment track is now curved to provide a more comfortable "tilt" in the full rear position and to improve the ease of adjusting the seats.

Airliner reclining seats, which can be adjusted to five positions and made into twin travel beds, again are available.

An improved All-Season air conditioning unit, which combines cooling and heating, is optional. Other major convenience accessories available are power window lifts, power steering and power brakes. The Powr-Lok differential is optional on V-8 Ramblers.

The Ambassador is powered by the 327-cu-in. AM V-8 engine, developing 270 hp. It is equipped with a new four-barrel carburetor and a full-flow oil filter. The engine has a compression ratio of 9.7 to 1, and a bore and stroke of 4 in. by 3¼ in. Dual mufflers and tail pipes are standard on all models.

A new Powr-Lok rear axle differential system is offered as optional equipment on all Ambassador models.

A step-on parking brake is featured on Ambassador and Rambler models. The brake is applied by depressing the foot pedal located under the left side of the instrument panel. It is released by pushing upward on a T-shaped handle.

All models in both series have dual headlamps.



Rambler Rebel Cross Country station wagon



Styling changes for 1958 are illustrated in this Rambler four-door sedan. Dual headlamps are among the new features of the line



Ambassador V-8 four-door hardtop station wagon

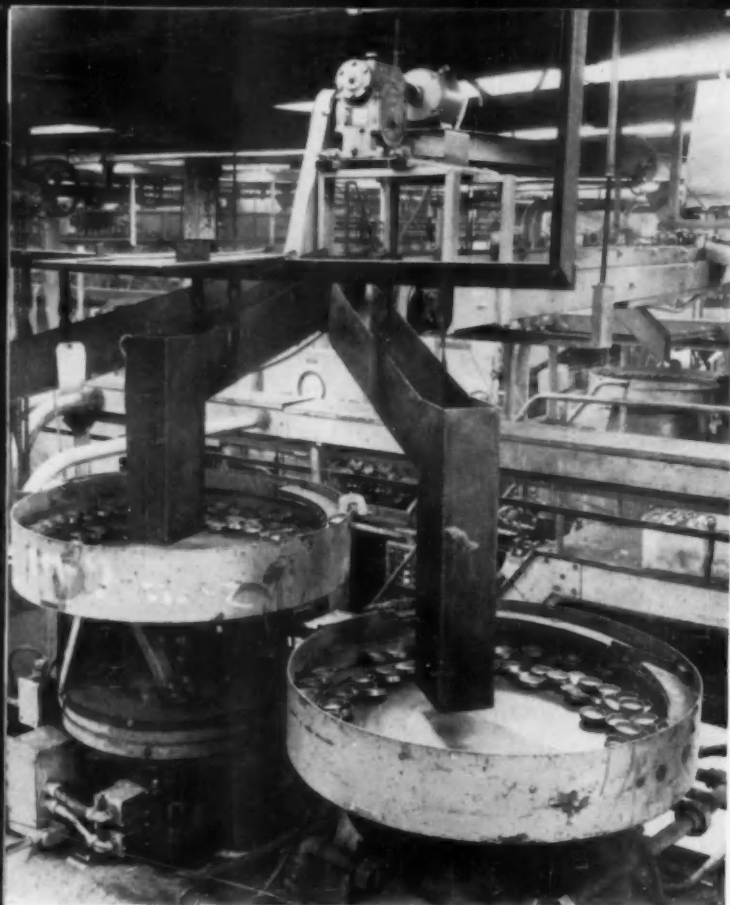


Fig. 1—Setup above the transfer lines for cylinder block machining, showing large Syntron hoppers that feed sealing plugs for jacket openings to magazines for delivery to insertion plunger cylinders.

LEAKS from the water jacket of any engine can result in serious trouble; hence, care to avoid such leaks is exercised in building automotive engines. At the Pontiac Motor Division plant, Pontiac, Mich., some unusual precautions are taken to seal the cored holes in the jacket of V-8 engines for Pontiac cars and, in addition, a careful test is made of every cylinder block to be sure that no leaks are present.

These blocks are machined along automated transfer lines. Operations include machining at six cored openings, two in each side and two in one end of the block. Each such opening later receives a stamped and drawn cup-like plug of $1\frac{7}{8}$ -in. dia and $\frac{3}{8}$ in. high. These plugs are fed through chutes to three large Syntron hoppers, Fig. 1, located above those stations on the transfer lines and thence through magazines to points where plug insertion is effected. Figure 2 shows a block in this station.

Before insertion occurs, however, a small amount of sealing compound is fed automatically into each of the recesses for the six plugs. When the block is in insertion position, a cup is fed automatically into the bore of each of six plunger cylinders, visible in Fig. 2. When hydraulic pressure is applied, these plungers press the cups into the six recesses, reducing the plug diameters about 0.005 in. because of the

Automatic Testing for Leaks in Cylinder Blocks

By Herbert Chase

press fit. After the plungers retract, the block is advanced along a track into the Ingersoll machine, Fig. 3, at the next station.

In this machine, an expanding air-driven tool is advanced into each plug and is rotated about 25 turns under expanding pressure produced by a tapered shaft acting on tapered rolls that force the cylindrical portion of each cup tightly against the mating bore of the recess. These expanders complete the sealing process, leaving the block ready to be checked for leaks.

Leak testing is done at the station, Fig. 4, after hydraulic clamping so that all openings into the jacket are sealed by plugs or gasket pads. In this test fixture, the block comes below dual sets of Moore testing equipment that are connected to the jacket during each test cycle. To make this test, air from a shop line is applied at about 50 psi for rapid fill, and 20 psi pressure from the testing circuit.

Admission of high pressure air into the jacket is stopped at 1 to 2 psi higher than the actual testing pressure. This overfill is then bled down, via the vent in the "Nullmatic" regulator to the testing pressure. A few seconds are then allowed for "balancing" the jacket pressure and the instruments. This method reduces the time required to fill the jacket.

In this Moore "Nullmatic" system, diagrammed in Fig. 5, a differential pressure is measured by a bellows type differential pressure transmitter that is remarkably sensitive, partly because only negligible bellows displacement is inherent in a "null" balance system. Also used is one "40-100" Nullmatic pressure regulator, for the pressure of the test. A differential pressure transmitter "10C40," with its booster, measures the differential resulting from a leak and transmits an amplified proportional signal. A "600" overload relief valve releases any excessive differential pressure and a Square D pressure switch

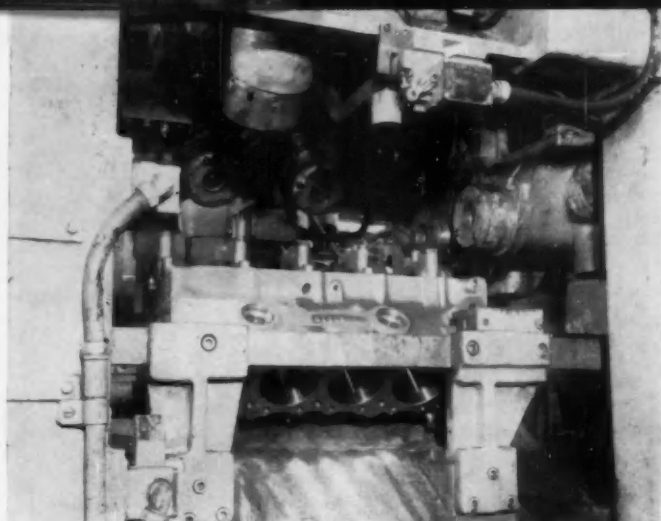


Fig. 2—Station where hydraulic plungers press the drawn cup plugs into six water jacket openings of the Pontiac cylinder block after each of the six recesses for the plugs has received its charge of sealer.

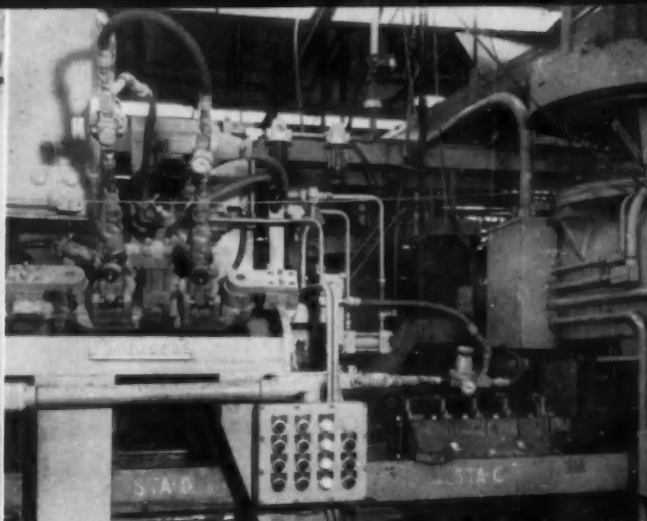


Fig. 3—At this station, an expander enters each cylinder block plug and is rotated to firmly press the cylindrical wall of the plug against the mating bore, greatly reducing the percentage of leakers and saving much repair expense.

is actuated when overfill pressure reaches the value set on the pressure switch.

No. 67-25 actuates PS-1 if a leak at the end of test time exceeds the setting of this relay. Solenoid A cuts out the 40-100 regulator during the test to insure that the test reference pressure remains constant. Solenoid B closes during the test to isolate the jacket space from reference pressure, enabling differential pressure to develop if leakage is present. Solenoid C remains open during test time and then locks in the final differential pressure. Solenoid D opens at the start of the fill cycle, permits overfill and then is cut out by the compensating relay, remaining closed for the remainder of the test operation.

PS-1 actuates an alarm light and is interlocked with selecting and sequence devices on the transfer machine. PS-2 closes solenoid D when overfill pressure is reached. Test sequence is controlled by an electric timer and normally started by a transfer machine control, though a manual button can be used.

As the cycle starts, solenoids B, C and D open and air from a plant line passes D until overfill pressure is reached. Then the Square D pressure switch actuates PS-2 to close D. Thereupon, solenoid A opens and regulator 40-100 bleeds the system to test pressure, producing the required balancing and making it possible to proceed with the test phase.

When the fill timer times out, the test timer starts and solenoids A and B close. This insures constant reference pressure, isolating the test volume. If leakage is present, pressure in this volume falls and output of the differential transmitter increases. If this output reaches or exceeds the cutoff set by the 67-25 relay, it actuates PS-1 and switches on a reject light. This signal is interlocked with a milling cutter that produces a reject mark for identification.

In the setup, two test cabinets shown in Fig. 4 are used and are so arranged that, though connected simultaneously, one indicates leaks at one group of three plugs and the other at the remaining three. Output is 108 cylinder blocks an hour.

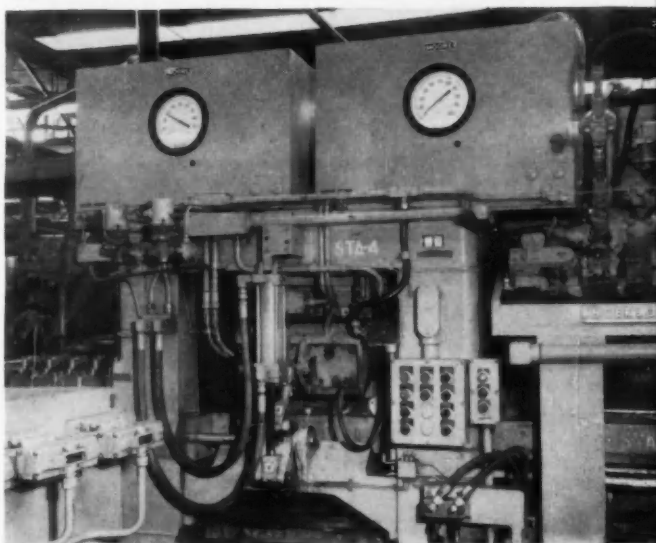


Fig. 4—Moore test cabinets above the station where, after sealing all jacket openings with hydraulic plungers and gasket pads, leak tests are made automatically and in step with the transfer machine, any leakers being marked for identification.

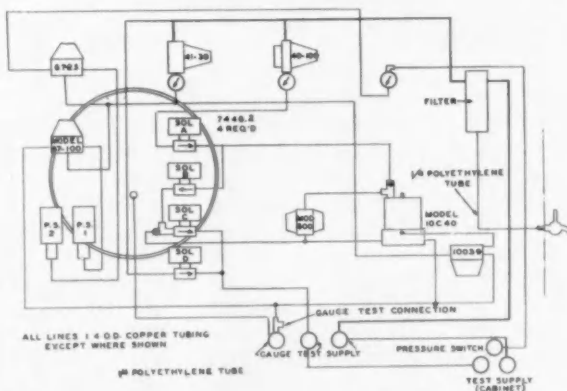


Fig. 5—Diagram of the Moore leak testing setup showing piping and connected units, including the differential pressure transmitter (10C40) that makes possible sensitive testing and rapid checking for leaks.

DEVELOPMENTS

in the Control of

Vehicle Exhaust Gases

THE automobile industry has spent \$3½ millions in the past 2½ years to learn as much as possible about motor vehicle exhaust gases and how to control them, it was reported at the recent National West Coast Meeting of the SAE, held in Seattle, Wash.

Much of the cooperative technical activity has been devoted to the development of new instruments and techniques for valid analysis of exhaust gas emissions. Other phases have been the development of devices for reducing the escape of small quantities of unburned fuel in exhaust and the study of special traffic and air pollution conditions in the Los Angeles area.

A great number of devices for control of fuel flow during deceleration were developed and tested. Some form of manifold vacuum-limiting device was found to be the most satisfactory. Such a device may take several forms, but its purpose is to prevent the vacuum from exceeding 21 to 22 in. of mercury. Above this

point, the incoming mixture does not burn completely and unburned fuel is passed on to the exhaust.

Meanwhile, the industry continued its work on diagnostic tools. Then, with these new instruments and methods, studies were made showing that only 30 per cent rather than 60 per cent of motor vehicle hydrocarbon emission occurs during deceleration. The remaining fraction of hydrocarbons are emitted during idling, cruising and acceleration.

Papers presented during the Seattle meeting outlined the complex work of developing the new analytical tools and of collecting essential data on Los Angeles traffic patterns. Following are extracts from five of the papers presented at the meeting.

Automobile Exhaust Treatment—An Industry Report

By AMA—Exhaust System Task Group

IN July 1955, the Vehicle Combustion Products Subcommittee of the Automobile Manufacturers Association organized the Exhaust System Task Group to study methods of removing hydrocarbons from automobile exhaust gases. The assignment was limited to treatment of the exhaust after discharge from the engine, a totally different approach from that assigned to the companion Induction System Task Group. Membership consists of engineering personnel from participating companies. Although primarily a technical group, it was also assigned responsibility to investigate other problems associated with exhaust treating devices, such as safety, cost adaptability, maintenance and inspection aspects.

The first activity of the Group was to survey the various methods of removing hydrocarbons from exhaust gases and select the more promising ones for further study. These methods were classified according to physical separation methods, chemical methods and, for want of a better term, miscellaneous methods.

It was found that oxidation appears to be the most practical method for removing hydrocarbons from exhaust gases and that one oxidation method, a catalytic converter, has shown some promise. In road tests, after warm-up, this experimental converter removed approximately 80 per cent of the hydrocarbons from exhaust gases. The catalyst has so far been resistant to poisoning by tetraethyl lead combustion prod-

ucts. Life tests are not completed.

Afterburners also show some promise, but none suitable for automobiles have been developed and submitted to the group. Indications are that the overall efficiency of afterburners will be somewhat less than that of catalytic converters.

The Group has not yet recommended any device to the parent Vehicle Combustion Products Subcommittee for industry-wide consideration or application. Various design, installation, and servicing problems associated with the application of an exhaust treating device, including size and space requirements, silencing, heat radiation, and periodic inspection and maintenance requirements, cannot be studied more closely until basic problems are overcome.

Automotive Exhaust Hydrocarbon Reduction During Deceleration by Induction System Devices

By AMA, The Induction System Task Group

IN a program planned to do everything possible to reduce the exhaust emissions which might be contributing to the smog problem, the automobile industry through AMA sent a group of technical men to Los Angeles early in 1954 to study the situation. The AMA at that time formed the Vehicle Combustion Products Subcommittee to work on the reduction of unburned hydrocarbon emissions from automobiles. Task groups were appointed by the Vehicle Combustion Products Subcommittee to attack various phases of the problem, including field surveys and development of instrumentation to measure hy-

drocarbons, and to develop means of reducing hydrocarbon emissions from automobiles. Specifically, the Induction System Task Group was assigned to develop and evaluate induction system devices for the reduction of hydrocarbons.

At the beginning of the group's work the equipment and techniques necessary for detecting and measuring hydrocarbons in exhaust gas were generally not well-developed but during the two and a half years the group has been active, the methods of testing and the instruments for measuring have been gradually changing. Naturally, this makes it difficult

to compare tests, but the improvements brought about by the changes have been worthwhile with the result that now all of the participating laboratories have similar equipment. All conceivable types of devices to accomplish this purpose were considered, and it has been possible to evaluate by tests of various automotive groups all of the most feasible methods of reducing hydrocarbon emission. The devices fall generally into two categories — those devices which stop the flow of fuel from the carburetor during the important deceleration cycle, and devices which maintain burnable mixtures during deceleration.

Determination of Hydrocarbon Emission Rate by Continuous Air Flow Measurement and Exhaust Analysis

By J. C. Neerman and G. H. Millar

Scientific Laboratory, Ford Motor Co.

TWO instruments have been developed as part of a program of portable instrumentation for measuring the emission of incompletely burned hydrocarbons in the exhaust of automotive vehicles on the road.

The first instrument is an infra-red interference filter photometer, Fig. 1, which measures and records the concentration of hydro-

carbons in the exhaust by means of their optical absorption at 3.43 microns. The second instrument is a viscous matrix air flow meter which measures and records carburetor intake air flow in a moving vehicle.

For road operation the photometer is placed in the trunk, permitting a short sampling line from the tailpipe. The control unit and

recorder in this case are located inside the car for convenience.

Before making determinations the analyzer source is turned on for several minutes to allow the instrument to reach a stable operating temperature. Subsequently, the steps in operating the analyzer correspond to the typical procedure for photometry. Zero and 100 per cent transmittance adjustments are made, the sample is introduced, and sample transmittance is read from either the potentiometer dial or recorder. The calibration curve provides the corresponding concentration of unburned fuel. (Continued)

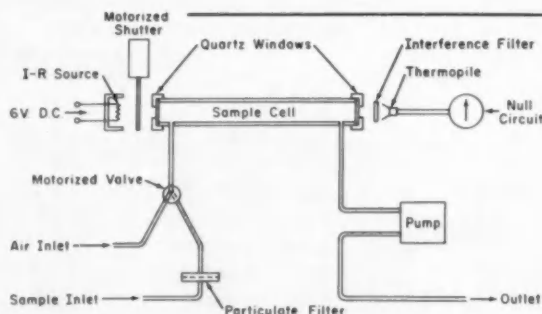


Fig. 1—Diagram of interference filter photometer

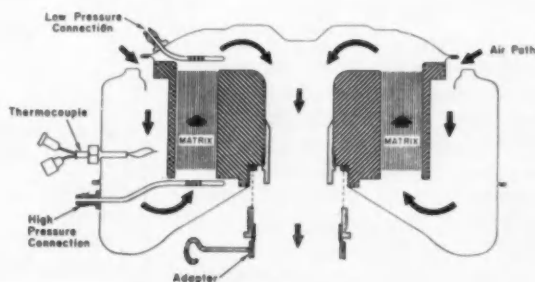


Fig. 2—Viscous air flow elements

(Continued from previous page)

The viscous matrix flow meter was developed to measure and record carburetor intake air flow on a moving car. This instrument fulfills the need for an air flow meter to be used in conjunction

with a portable infrared exhaust gas analyzer to determine the rate of emission of exhaust components from vehicles on normal road operation. The instrument imposes no modifications or abnormal operating conditions on the vehicle,

and it is rugged, portable, compact, simple to use, and readily adaptable to a variety of post-war automobiles. An accuracy within 10 per cent of indicated air flow can be obtained with this application.

An Integrator for Determining the Total Emission of Automotive Exhaust Gas Components

By R. T. VanDerveer, J. D. Jenks and R. L. Dennis

Ford Motor Co. Engineering Staff

A SYSTEM of totalizing the hydrocarbon emission from an automobile during operation has

been developed and evaluated. The system, shown in Fig. 1, involves the use of multiplying potentiom-

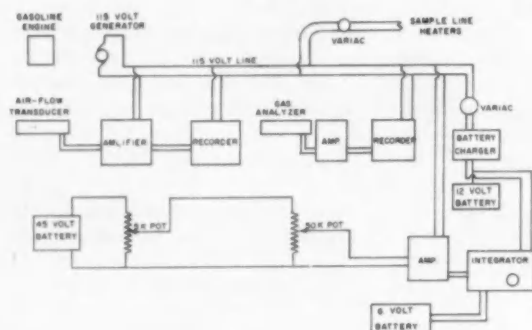


Fig. 1 — Equipment arrangement for totalizing hydrocarbon emission

eters to obtain the product of cubic feet per minute of exhaust and exhaust hydrocarbon concentration. The product (CFM of hydrocarbon) is integrated electronically and totalized during vehicle operation as the accumulated weight of hydrocarbons emitted.

Mobile electronic multiplication and integration is entirely feasible for the determination of hydrocarbon emission. It gives the air pollution and automobile engineer an analytical tool that permits exhaust evaluation under actual driving conditions by doing away with the need for tedious and lengthy graphical analysis using type transients. The instrument can be used for carbon monoxide and carbon dioxide determinations with properly sensitized cells, and will be applicable to oxides of nitrogen determinations with the advent of a continuous NO_2 analyzer.

Single Cylinder Engine Tests of Oxidation Catalysts

By W. A. Cannon, E. F. Hill and C. E. Welling

Ford Motor Co.

ALTHOUGH other methods for the removal of hydrocarbons from an exhaust gas stream were considered, such as surface combustion, absorption, and recycling, none appeared to be as practicable and operable as the use of an oxidation catalyst.

A number of catalytic materials were evaluated by determining the temperature at which hydrocarbon oxidation started and the temperature at which oxidation was complete, using a "synthetic" exhaust gas and space velocities corresponding to these expected in passenger car operation. As a result of this work the materials listed in Table I were selected for further study.

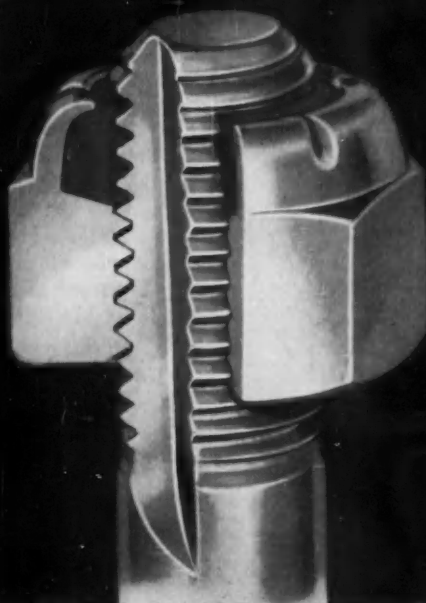
The removal of acetylene from air fed to liquefaction plants has been accomplished by catalytic oxidation and some variety of ma-


terials have been suggested. However, none of these applications have to contend with the presence of combustion products of tetraethyllead and its associated scavengers and it is these materials which introduce a new and unknown dimension to the search for an automotive exhaust gas catalyst.

Catalyst	Active Material (%)	Form	Apparent Bulk Density g/ml.
Iron Oxide	97	3/8 in. Tablets	1.4
Copper Oxide	10	3/16 in. Tablets	1.0
Copper Chromite	100	1/8 in. Tablets	2.0
Vanadium Oxide on Alumina	10	1/8 in. Tablets	1.0
Hopcalite	100	4/8 Mesh Granules	1.2
Nickel	60	1/4 in. Tablets	1.1
$\text{Ag}_2\text{O} + \text{BaO}$ on Alumina ..	5	6/12 in. Mesh Granules	1.6
Platinum on Alumina	0.36	4 Mesh Granules	1.2

Table I—Catalysts selected for engine testing

The nylon collared Elastic Stop[®] nut never damages bolt threads!



The nylon locking insert * will not seize threads, gall or remove plating

The red nylon locking collar is an integral part of an Elastic Stop nut. Oversize in diameter in relation to standard bolt tolerances, this insert grips the entering bolt threads with strong, smooth nylon fingers that dampen impact loads and resist turning under the most severe conditions of vibration or shock. The perfect fit between bolt threads and the locking collar also serves to seal off internal bolt and nut threads and to protect them against corrosion. Furthermore the nylon insert is impervious to gasolines, oils, salt atmospheres, cleaning compounds and common acids. The remarkable wear resistance of nylon plus its elastic recovery makes Elastic Stop nuts reusable through more than a hundred on and off cycles.

Because an Elastic Stop nut is a one-piece unit it is less expensive to install than castellated nuts and cotter pins, or double nuts. Equally important, it is a *stop* nut that *locks at any position on the bolt* without requiring secondary "safety" devices; it is simple to adjust precisely—it is easily wrenched off or readjusted. Elastic Stop nuts have been used by American industry since 1930 to solve the toughest applications on railroad, automotive, earth moving and farm equipment, as well as on all types of electrical machinery.

Elastic Stop nuts are available in sizes ranging from a watchmaker's 0-80 through 3", and in many standard finishes and materials including carbon and stainless steels, brass, duronze and aluminum.

ELASTIC STOP NUT CORPORATION OF AMERICA



also maker of the



*The Red Locking Collar is a
Registered Trademark of ESNA

Elastic Stop Nut Corporation of America
Dept. N27-105, 2330 Vauxhall Road, Union, N. J.

Please send me the following free fastening information:

☐ ELASTIC STOP
nut bulletin

☐ Here is a drawing of our product. What
self-locking fastener would you suggest?

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

big or small, Surface mechanized furnaces pay off

wherever heat is used in industry

Whether your volume is modest or vast—with short runs or long—there are many ways to profit from Surface experience in mechanizing heat treat equipment for ferrous and nonferrous metals. All of them give you uniform duplication of results; upgraded labor; reduced unit costs; expanded capacity; and strengthened competitive position.

➡ You may require a single batch type furnace, (right above) in which work is handled automatically from charge to discharge. For expanded facilities, a battery of such furnaces can be handled by one operator. Standard furnaces can also be linked in sequence to form an automatic heat treat line.

➡ You might want your furnaces integrated directly with machines at separate points in your production line, (right center). This line processes bearing races from raw stock through a sequence of manufacturing operations—machining, heat treating, and finishing.

➡ Your methods may call for a self-contained automatic heat treat line within your production line, (right below). Hoppers convert variable production from machining operations to the steady rate best for efficient heat treating. All operations are interlocked and continuous.

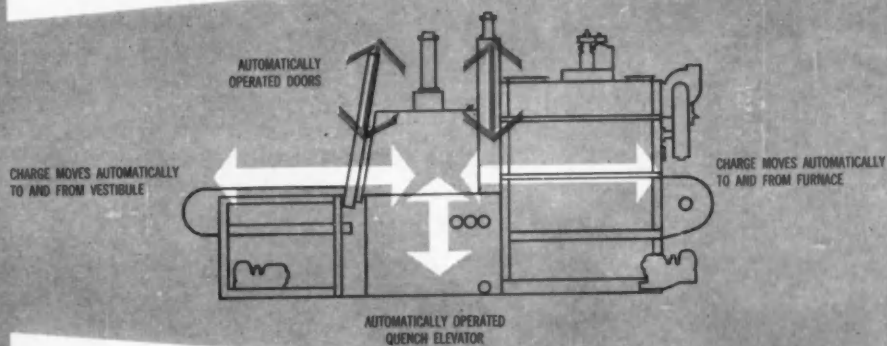
These are merely samples of the range and depth of mechanization know-how which Surface has accumulated since as far back as 1929. That was the date of installation of a completely automatic line for normalizing, hardening, and tempering transmission parts. Still operating, that line has paid for itself many times over.

Explore these advantages for your own operation; write for Bulletin SC-176.

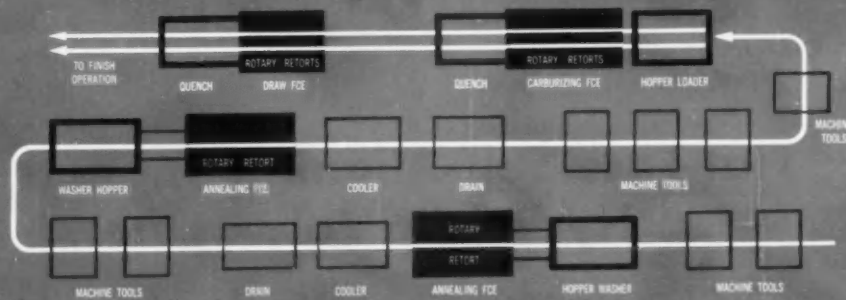
Surface Combustion Corporation, 2397 Dorr St., Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.



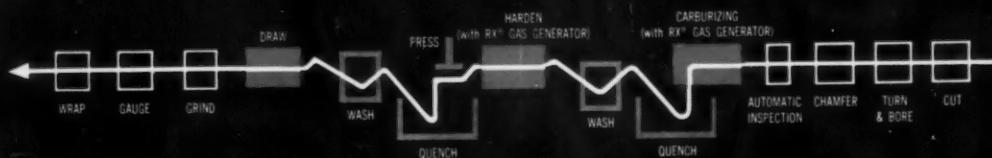
BATCH furnace mechanization



IN-LINE furnace mechanization



TOTAL furnace mechanization



Is Your Engine "Horsepower-Limited" by Tappet Face Stress?



Flat-Face Self-Aligning Tappets and Hydraulic Valve Lifters

The high cam lifts and heavy valve spring loads involved in developing higher horsepowers place increased stress on cams and tappets. Spherical face tappets make only limited-area contact with the cam, which frequently results in damaging wear or pitting. Flat-face tappets lower the unit stress, but their use has been limited by misalignment and deflection, which cause edge-riding. The Eaton self-aligning flat-face tappet permits full contact between cam and tappet to be maintained under all operating conditions.

Improve your engine by taking advantage of this new Eaton engineering development which has broken through the stress barrier. Call our engineers for a consultation.

EATON

—SAGINAW DIVISION—
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN

Unusually Tough BOLTS!

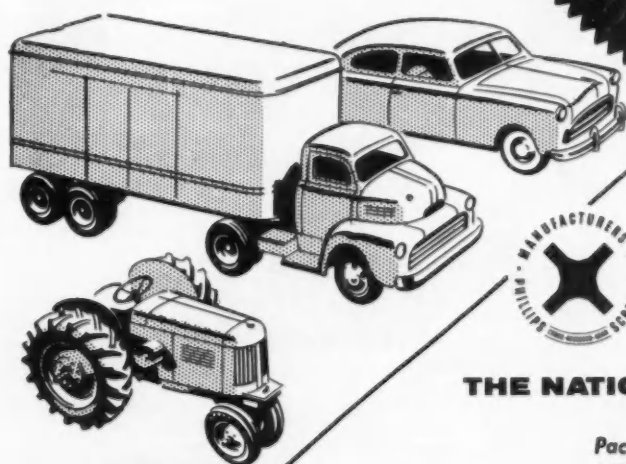
As vital parts of tractors, dirt movers and other heavy-duty equipment, these big bolts can take a terrific beating and still hold fast. They will resist shear, fatigue and impact that no common bolts could withstand without wear or breakage. Special heat-treatment produces this unusual toughness, making these National bolts capable of enduring extremely severe stresses.

By cold heading and special production methods, National can turn out many special headed-and-threaded fasteners which, like these bolts, solve special problems or reduce costs. Depend on National's extensive manufacturing facilities and complete line of fasteners for your needs.

Write for a free copy of National's "Special" fastener booklet.

Representatives in:

Chicago	Indianapolis	Philadelphia
Cincinnati	Kansas City, Mo.	Portland
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Detroit	Minneapolis	St. Louis
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THE NATIONAL SCREW & MFG. COMPANY CLEVELAND 4, OHIO

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.



Fasteners

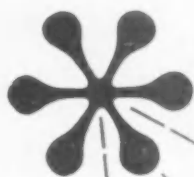


Hodell Chains



Chester Hoists





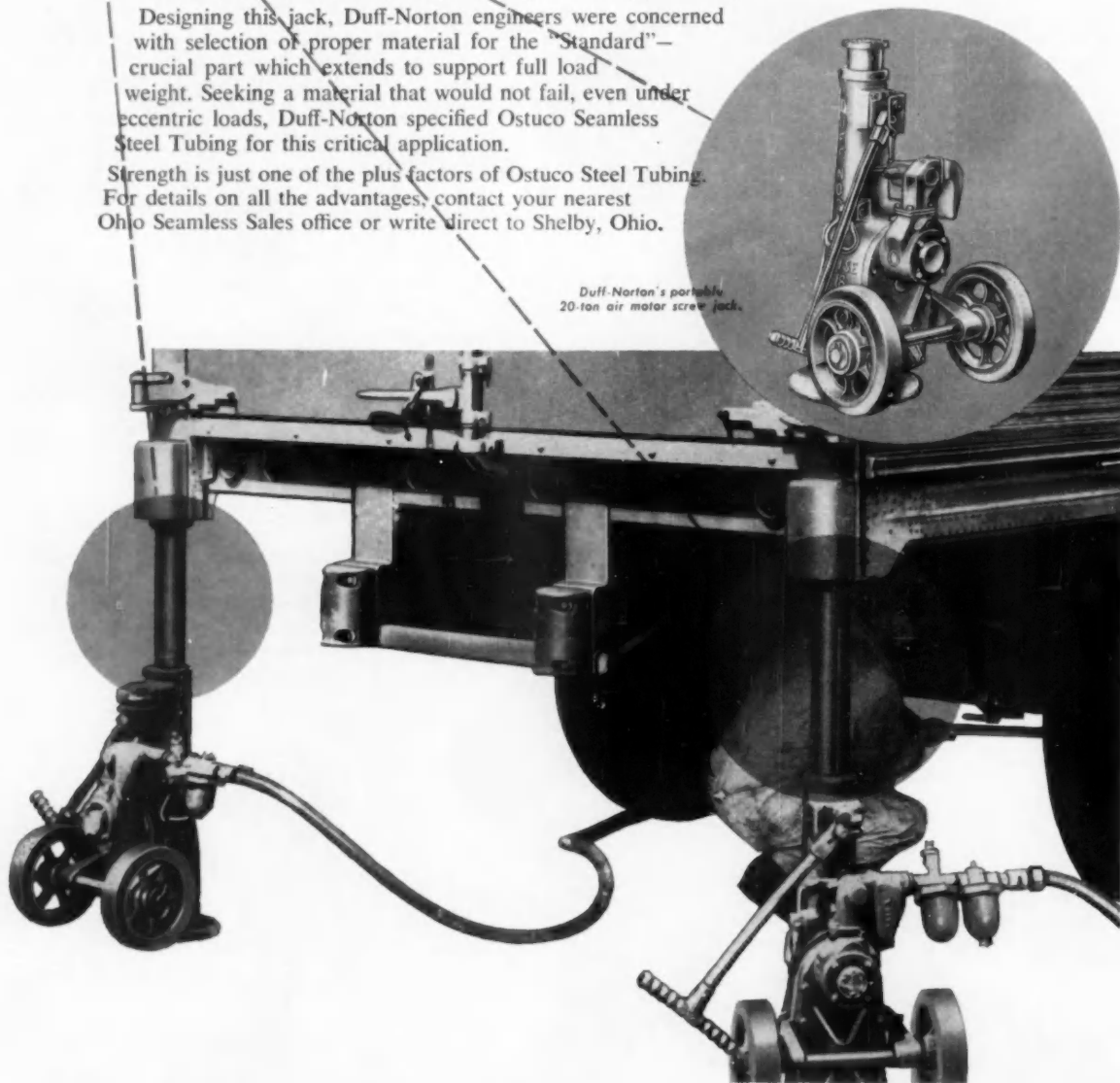
STRENGTH PROBLEM SOLVED with Ostuco Steel Tubing

Duff-Norton Company, Pittsburgh, manufactures a portable 20-ton air motor screw jack now finding wide acceptance as a maintenance tool by the trucking industry because of its versatility, dependability, and rugged strength.

Designing this jack, Duff-Norton engineers were concerned with selection of proper material for the "Standard"—crucial part which extends to support full load weight. Seeking a material that would not fail, even under eccentric loads, Duff-Norton specified Ostuco Seamless Steel Tubing for this critical application.

Strength is just one of the plus factors of Ostuco Steel Tubing. For details on all the advantages, contact your nearest Ohio Seamless Sales office or write direct to Shelby, Ohio.

Duff-Norton's portable
20-ton air motor screw jack.



OSTUCO TUBING

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EXCLUSIVELY BY

OHIO SEAMLESS TUBE DIVISION
OF COPPERWELD STEEL COMPANY

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NEW

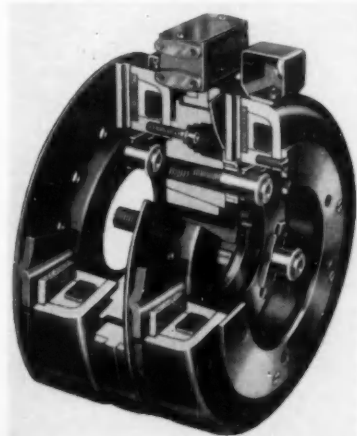
PRODUCTS

AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Power, Motion Controls

A new line of industrial brakes and clutches has been developed by the Dynamic Division of Eaton Mfg. Co. The new Dyna-torQ units are electro-



magnetically operated disk-type, friction brakes and clutches. They operate on the principle of electro-magnetic engagement of two friction members, the armature and the field magnet, to develop driving or braking torque.

Controls may be remotely mounted to conserve space on the processing equipment. Rapid response in clutching and braking, effective cooling and automatic adjustment are all features of the new units.

Four types in production are the basic clutch, the basic brake, the clutch-brake and the clutch-coupling. These are available in a wide range of capacities. Corresponding parts of all units in a given size are completely interchangeable. *Dynamic Div., Eaton Manufacturing Co.*

Circle 30 on postcard for more data

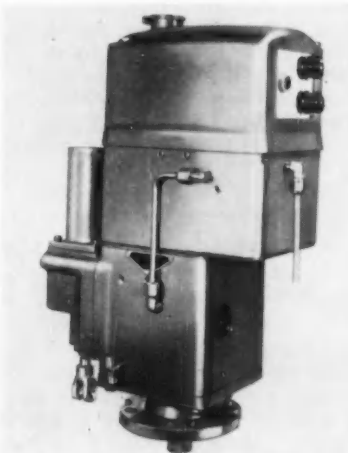
Speed Governor

Offering increased accuracy of pneumatic speed setting, as well as electric speed setting, Woodward PG-PL governors are now available with

a new speed setting mechanism. The mechanism is of a completely new design specifically developed for applications requiring precise control. It responds to a 0.001-psi change in control air pressure within the usual 3 to 15 psi range. Normal accessories, such as pneumatic or electric shut-down devices, are available. The governor can also be furnished to operate from the output of electric controllers now in general use.

Advantages of the new governor include easy adjustment in the field for any desired air pressure versus speed relationship or for reverse speed setting. It can be adjusted for extra low standby idle speed, for normal minimum speed, or to shut down an engine or turbine by direct speed setting.

The ultra-precise PG-PL governor is suitable for applications where accurate speed control of turbine or engine is required with pneumatic (electric) speed setting. It is usable for maintaining constant pressure or suction; constant flow, liquid level, temperature, or other quantity which can be controlled by an air or electric con-

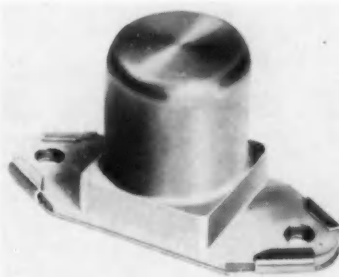


troller to set governor speed; and to provide pneumatic speed setting where hazardous atmosphere precludes the use of electric motors for speed-setting. *Woodward Governor Co.*

Circle 31 on postcard for more data

Floating Anchor Nut

Produced to fulfill current aircraft requirements, a new floating self-locking anchor nut incorporates a counterbore used to prevent bolt threads in bearing. Overall weight of the nut is 0.69 lbs/100. Installation is simplified through a minimum



radial float of 0.025 in. in the nut body to compensate for possible misalignment of bolt holes. Maximum recommended bolt entry for the nut, which is available in 10 to 32 thread size, is 0.519 in. The new LHA401K4 anchor nuts perform under temperatures from -80 to 550 degrees F., and meet all requirements of An-N-10 and/or MIL-N-25027 (ASG). *Elastic Stop Nut Corp. of America.*

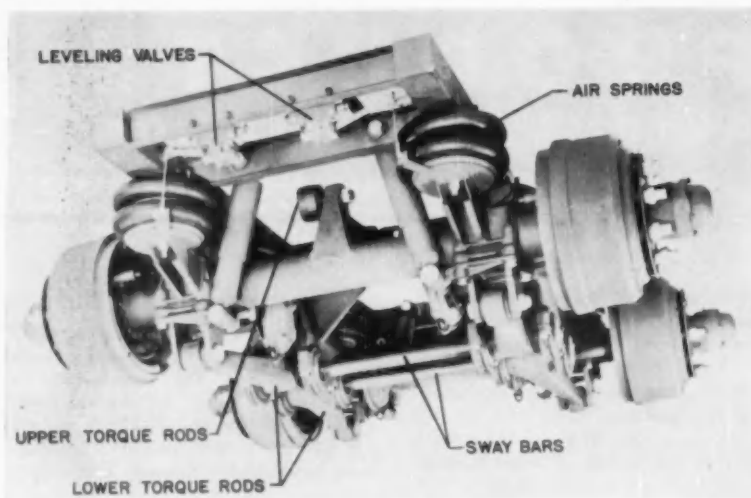
Circle 32 on postcard for more data

High Compression Seal

For sealing high compression engines, a new gasket has been developed known as Victocor. The new device is said to assure getting maximum power from engines by sealing in all potential power. This material is thin and flexible. Heat conductivity is obtained with a patented, thin steel core formed with 800 projections per sq in., projecting alternately on each face. The sealing element is an asbestos-elastomeric compound and is simultaneously bonded to both faces. Victocor maintains dimensional stability and retains coolants. They are installed without precoating. *Victor Mfg. & Gasket Co.*

Circle 33 on postcard for more data
(Turn to page 80, please)

NEW PRODUCTS CONTINUED FROM PAGE 79



Clark semi-trailer air suspension system

Integrated Air Suspension System

A semi-trailer air suspension system featuring integrated air reservoirs and advanced sway control designs has recently been developed. The units are available in single axle models of 18,000 and 20,000 lb capacities and tandem models of 32,000 and 36,000 lb capacities. Each is offered in packaged assemblies of frame, air springs, reservoirs, shock absorbers, filters, leveling valves and sway bars for installation on new equipment or operating trailers. Interchangeability of parts between single and tandem models is provided.

Air reservoirs are integral parts of the unit. Air is delivered to each reservoir by a common line from the tractor's compressor. Each reservoir in turn serves one side of the air suspension independently of the other. Thus the trailer bed is said to remain level both laterally and vertically under all load conditions. Built in sway bars are provided to minimize lateral roll. Two lower torque arms and an upper torque rod maintain and position the axles laterally and absorb brake torque. *Clark Equipment Co.*

Circle 34 on postcard for more data

Diaphragm Seals

Diaphragm seals for aircraft, missiles and rockets, and having industrial applications, are now available from Stillman Rubber Co. Fabricated from fabrics such as nylon, dacron



and fiberglass, the new seals are coated with silicones and other common elastomers.

The company fabricates diaphragms with bore dimensions of up to 12 in.

and with a convolution drawn to depths of four in. They are capable of sealing effectively at temperatures ranging from -65 to +500 degrees in a variety of fluids. *Stillman Rubber Co.*

Circle 35 on postcard for more data

High Pressure Hose

Availability of a wire-braided steam hose for high pressure, high temperature service has been announced. Known as the Gibraltar steam hose, it is designed for use with saturated steam pressures up to 200 psi or for handling super-heated steam at temperatures up to 385 degrees F.

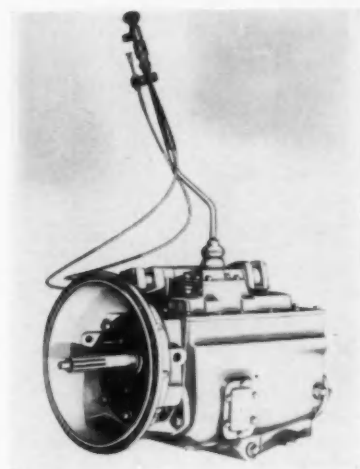
This hose is constructed with heat-resisting rubber tube and features two braided plies of high tensile reinforcing wire. These reinforcing wires guard against hose rupture or

bursting during operation. A heat, oil and abrasion resisting neoprene cover is bonded to the wire carcass by a ply of high-tensile, heat-resisting cord yarn. Used for steam handling and steam jenny service, the braided steam hose is available in sizes from ½ in. ID to 2½ in. ID. These sizes weigh from 62 to 230 lb per 100 ft. *Acme Hamilton Mfg. Corp.*

Circle 36 on postcard for more data

Heavy Duty Transmission

For use in heavy duty trucks, a new 12-speed transmission designated Model 8125 Synchro-Master 12, is now being offered. Twelve speeds are provided in the new unit to give sufficient low gear reduction and spread to handle various road conditions without the use of an auxiliary transmission or two-speed axle, as well as



to produce the close steps required to maintain engine speeds at maximum rpm for fuel economy and to avoid engine lugging.

Specifications include tower control assembly 300175, remote control assembly 300169 and SAE No. 1 and No. 2 clutch housing as required with Spicer 14- and 15½-in. two-plate clutches. Major castings are aluminum, weight 600 lb. Some of the features are blocker-type synchronizers in all speeds, forward and reverse, and all six low range ratios are available in reverse. It also has forced feed lubrication, standard six bolt SAE power take-off apertures on each side, equally spaced steps between ratios and replaceable bearing retainer inserts in all case bores. *Dana Corp.*

Circle 37 on postcard for more data

NEW

PRODUCTION and PLANT

EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89



New line-index machine performs up to forty drilling, boring, turning and tapping operations on three different tractor drive axle housings

Partial Automation in New Line-Index Type Machine

RECENTLY introduced, a new line-index type machine performs up to forty drilling, boring, turning and tapping operations to complete the machining of three different large tractor drive axle housings made of either malleable iron or cast steel. The part to be machined is mounted in a fixture with a built-in index table. The fixture and table unit is indexed in a line to six stations between a pair of opposed wingbase machining units. Where required, the fixture is rotated 180-degrees between stations.

The first pair of machining units that operate in stations one and two consist of a two-spindle boring head and an opposite single-spindle cross facing head. The second pair of machining units, portions of which operate in stations four through six, consist of a 31 spindle drill head and likewise an opposite 25 spindle tapping head. Machining operations are accomplished by pushbutton controls that index the fixture back and forth between the stations, rotate the fixture in accordance with a program sheet and cycle the machining heads. Quick change adapters in certain spindles facilitate the 28 tool changes that are made to complete the machining of the part.

This machine is hydraulically operated and electrically controlled. Separate hydraulic power packs provide power for operating the machine slide and index motions. All machining units have hardened and ground ways.

The tapping head has individual, automatically-lubricated, lead-screw drives for each spindle. The heads are driven by 7½, 10, 15 and 20-hp motors. Snyder Tool & Engineering Co.

Circle 50 on postcard for more data

Pneumatic Grinder

LATEST in a line of pneumatic hand tools are the new 1500 series



Cleco grinder for metal grinding, sanding, and wire-brush operations

grinders which were designed for use in a variety of metal grinding, sand-

ing and wire-brushing operations. Magnesium alloy castings are used in this new device and the lever-type thumb-tip throttle provides control. A special muffler handle reduces noise and serves as an air exhaust. The basic tool is available in a variety of speeds and for several different wheel and guard mountings. Cleco Air Tool Division, Reed Roller Bit Co.

Circle 51 on postcard for more data

Molten Metal Pump

MODEL 9025-M, a new vertical centrifugal gusher pump built for handling molten metals such as solder, tin, zinc and lead at temperatures up to 700 F is now being offered. Safe operating temperature is maintained by three aluminum fans which rotate simultaneously with the heavy one-piece extended stainless steel shaft. The unit is available with either ¼-hp, 1140 rpm or ¾-hp, 1725

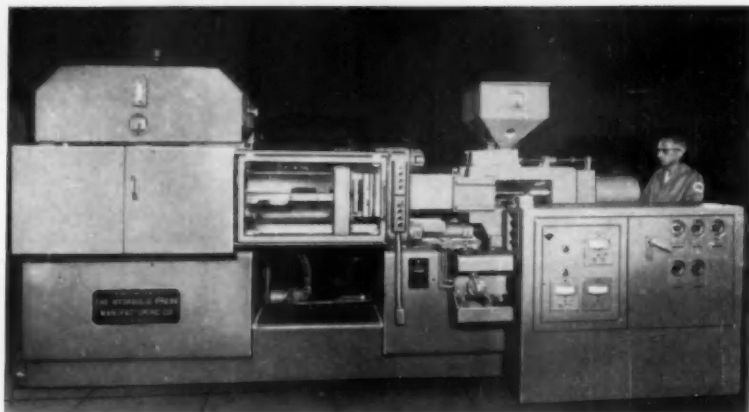


Ruthman centrifugal gusher pump, Model 9025-M

rpm, class B insulated motor, for capacities up to seven gpm and heads up to eight ft. The Ruthman Machinery Co.

Circle 52 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT



Model 200-H-6/8, plastics injection molding machine

Six to Eight Ounce Plastics Injection Molding Machine

Now being offered to the plastics industry is a new six to eight ounce plastics injection molding machine designated Model 200-H-6/8. The new 200 ton unit with a 30 hp motor, has a full hydraulic clamp with a 15-in. stroke and 25-in. daylight, and the clamp automatically adjusts for different mold thicknesses. Any part of the total ram stroke can be used and clamp controls are centralized. Movable cams provide adjustment for stroke, daylight, slow-close for die contact, slow breakaway and ejection stroke. Independent clamp and injection circuits allow simultaneous traversing of both clamp and injection rams. The injection circuit features controls for prepacking for shots eight ounces or over, flow control for plunger slow-down, dual pressure adjustment for lower holding pressure after mold is filled and automatic unloading of injection pump. A differential circuit allows prepositioning of the injection plunger at the start of the cycle. Clamp pressure build-up then actuates the injection plunger for the shot. The entire injection assembly, hydraulically actuated, is mounted on phenolic shoes on guided ways. Hydraulic pressure holds nozzle on sprue bushing and provides retraction of the entire injection unit for purging or easy removal of the heating chamber.

A separate pilot circuit has external pressure and pilot lines to each individual valve.

Large 26- by 26-in. platens provide space to mount mold bases up to 15- by 26-in. either vertically or hori-

zontally. The knockout bar exerts 15 tons pressure and has a 4-in. stroke. This bar can be moved for either a horizontal or vertical knockout pattern. Automatic clamp slow-down is provided prior to bar contact to prevent damage to ejected parts. The forged torpedo of the heating chamber is of one piece construction permitting placement of heating bands directly on the torpedo section.

The electric control panel houses the main electrical controls, including motor starter, pyrometers, timers, relays and transformers. The electrical circuit between machine and panel is wired before shipping from the factory. *The Hydraulic Press Mfg. Co.*

Circle 53 on postcard for more data

Electronic Measuring Device

INTRODUCTION of a new electronic system of precision measurement has been announced. The basic unit of



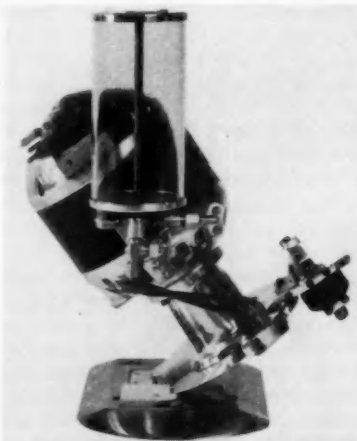
Electronic gage

the system is a small hermetically sealed gage head. Amplitude of the electronic signal maintains linear relationship to contact movement. The Electro-Probe head, measuring $1\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{1}{2}$ in. can be used with various types of contacts and contact mountings and can be operated with any one of several types of amplifiers according to application needs. Gage heads are interchangeable and may be employed jointly or in rapid succession by switching. Designated Model 230P-2, it includes a light weight portable, battery powered, transistor amplifier plus accessories. Its applications include precision measurement on surface plate or machine and it is suited to general and patrol inspections. The unit is independent of external power and has two ranges available by switching (0.004 in. range at 0.0001 in. grad. or 0.002 in. range at 0.00005 in. grad.) *Federal Products Corp.*

Circle 54 on postcard for more data

Rubber-Skiving Machine

Now available is a new portable rubber-skiving machine that simultaneously cuts and skives slabs up to $\frac{1}{2}$ in. thick of cured, uncured and synthetic rubber and foam, making a uniformly smooth and accurate cut. The bevel is fixed at an angle of 35 degrees off the horizontal. The machine features a moistening device



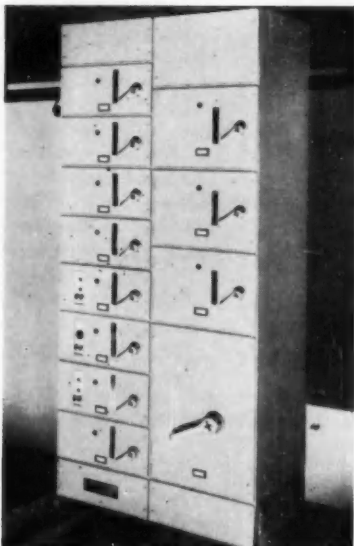
Self-sharpening rubber-skiving machine

that can be controlled for lubrication of the knife and an automatic knife-sharpener renews the knife edge as the machine is in operation. *Eastman Machine Co.*

Circle 55 on postcard for more data

Control Center for A-C Motors

RELASE of a new Class 11-350 control center for groups of a-c motors has been announced. The new unit houses controls for 3-phase a-c systems at 220 volts, 1 to 100 hp and 600 volts, 1 to 200 hp. All controls are centralized in one group of stationary, interchangeable enclosures, each with a grouping of modular starter units. Individual structures are approximately 90 in. high and 20 in. wide, and may be combined in straight-line, l-shape or u-shape assemblies. They are available for both front mounting and back-to-back mounting controls, in NEMA 1 indoor or NEMA 3 outdoor weather-resistant enclosures. Each structure contains a main horizontal 3-phase bus lowered 12 in. from the top, and



Westinghouse centralized control center with a circuit protective device consisting of a type AB air circuit breaker or a fusible disconnect switch used in combination with a motor starter.

a 3-phase vertical bus for distribution of power to starter units. Starters are of the combination-magnetic type consisting of a circuit protective device and a starter. Plug-in stabs are provided on the rear of each draw-out starter unit for power connection to the vertical bus. Control unit doors have rolled edges and a neoprene gasket. Starter units are available in NEMA type A with no terminal, NEMA type B with individual terminal blocks on each starter, or

NEMA type C with individual unit terminal blocks and complete factory wiring to master terminal blocks at either the top or the bottom of each structure. *Westinghouse Electric Corp.*

Circle 56 on postcard for more data

Conveyor Lubricant

DEVELOPMENT of an extreme high temperature oil, called Anderol L-825, has been announced. It is designed for use on conveyor belt operations where operating conditions and temperature ranges require an unusual lubricant. Operating range of Anderol L-825 goes up to 500 F continuously and to over 600 F for short periods of time. Under these high temperature conditions the lubricant is said to have high film strength and load carrying properties, with reduced volatility. Time between re-lubrications is stated to be materially increased. *Lehigh Chemical Co.*

Circle 57 on postcard for more data

Turbine Wheel Balancer

AMACHINE for balancing single stage turbine wheels in rotation has been developed as an addition to a standard line of vertical production balancers. The wheel is rotated inside a shroud at 650 rpm. At this speed, sufficient centrifugal force is generated to locate the blades in their

operational position. Unbalance is then indicated on a meter in ounces,



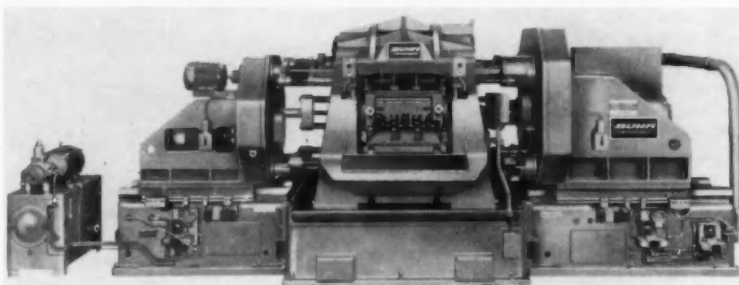
Trebel balance indicator.

grams or any other unit of correction. Angular position of unbalance is shown in degrees on a graduated disc inside the machine housing.

Three indication ranges with variable ratios provide for indicating accuracy and large initial unbalances. The entire acceleration, measuring and deceleration is controlled by a single lever. *American Trebel Division of Kurt Orban Co., Inc.*

Circle 58 on postcard for more data

Six-Station, Two-Way Trunnion Machine



This six-station, two-way trunnion machine was designed to produce up to 64 automotive crankshafts per hour. Four different crankshafts can be processed without the need of fixture detail and tooling changes. The left-hand head drills, countersinks, counterbores, spotfaces and taps one hole in the front of the crankshaft. The right-hand head drills, countersinks and reams eight bolt holes and drills, countersinks and counterbores one hole in the rear end of the crankshaft. The eight bolt holes are held concentric with the OD of the rear end flange by piloting the bushing plate on the flange of the workpiece. Features of the machine include cluster heads with individual bushing plates incorporated in a master gear box, automatic lubrication of all moving parts and JIC standards throughout. (*Buhr Machine Tool Co.*)

Circle 59 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT



Sesco feed unit can be attached to a press to feed right, left, front or back and can be timed to feed-in during any portion of the press cycle. The four legs are adjustable for leveling.

Twin-Cylinder Hydraulic Gripper Feed Unit

Now available is a twin cylinder hydraulic gripper feed unit which consists of two grippers, each operated by a hydraulic feed cylinder. The cross head cylinders are sequenced so that while one gripper grips the stock and moves it forward, the other gripper is returned for the next feed stroke. The adjustable hydraulic feed cylinders have a two-piece piston mounted in tandem, inside each cylinder. These are designed in such a way that the distance between the two pistons can be changed by turning a stroke adjuster handle mounted on the side of the unit. Positive internal stops assure duplication of the stroke length. Shock absorbers have been incorporated to prevent impact at each end of the cylinder.

The reciprocating travel of each pinch gripper is governed by the stroke adjustment within the cylinder. Through proper sequencing the pinch grip takes place before any forward feeding is possible, and the grip is not released until the forward motion has been completed. A hydraulic tank unit assembly serves as a base. On it, the other sub-assemblies are mounted. Rear stock guide assembly is provided to assure proper alignment of the stock with the feed assembly. It is adjustable to handle various stock widths. A front stock guide assembly is provided to guide the stock properly into the die. The stock guide rolls are adjustable and designed to make it easy to adjust for various stock widths. In addition, there is a stock retainer assembly de-

signed to prevent the stock from slipping backward on the return stroke of the gripper. A control panel is also mounted on the tank assembly.

The new unit is available with or without a stock oiler, and is adjustable to receive stock widths from 1 to 10 in. and stock thicknesses to 0.187 in. The length of the feed can be built to a maximum of 36 in. Sesco Inc.

Circle 61 on postcard for more data

Magnetic Chuck

LARGEST in a line of chucks is a new permanent magnetic chuck having a work surface 8¼ in. wide by 24 in. long.

Bar poles, ¼ in. wide, give uniform holding over the entire chuck top. Secondary external fields are cancelled to prevent magnetism from entering the machine table or ways. In the off position, the chuck is completely demagnetized. Ceramic mag-

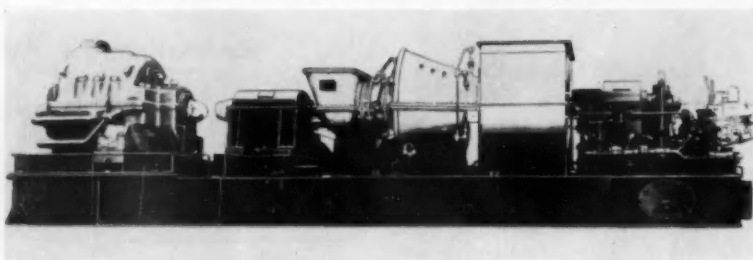


No. 824 magnetic chuck.

nets are used. The No. 824 chuck is suitable for holding work for milling and planing. When milling or planing, the cutting tool is automatically subjected to a demagnetizing influence during the cutting cycle, as the magnets are polarized horizontally rather than vertically. O. S. Walker Co., Inc.

Circle 62 on postcard for more data

Single Shaft Gas Turbine Powerplant

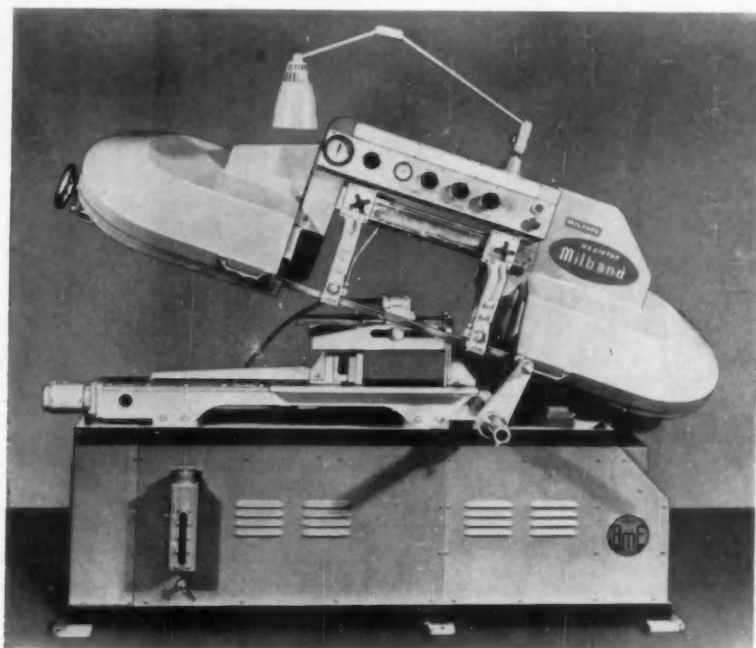


Westinghouse 3250 hp gas turbine and driven equipment on a common bedplate.

A NEW 3250 hp gas turbine used as a mechanical drive for pumps, compressors or generators has been added to a line of gas turbines rated at 5000, 8000 and 12,000 hp. The open-cycle turbine operates at 8500 rpm and any output speed can be obtained through the use of gearing. A quick starting feature permits the power plant to reach operating speed in less than three minutes. At full load,

the exhaust flow is approximately 191,000 lbs per hour at 775 degrees F. It is 21 ft long, 6 ft wide and 4½ ft high and weighs 14,000 lbs. Mounted on a common bedplate the unitized structure consists of gas turbine, driven apparatus and starting equipment and controls. The total weight of the plant is 27,600 lbs. Westinghouse Electric Corp.

Circle 63 on postcard for more data



Milford band saw is equipped with oversized 22 in. diam blade wheels.

Heavy Duty Band Saw Machine Tool

DEVELOPMENT of a heavy duty band saw machine built to utilize the full cutting capacity of high speed steel band saw blades has been announced. This tool is known as the Milford Rezistor Milband Machine.

A wide range of variable blade speeds is provided, from 40 to 360 fpm. All machine motions are controlled from a single panel at the front of the machine. A 3 hp motor provides power to drive the blade under all loads. Correct blade tension is set at the factory and is automatically maintained by a hydraulic tensioning cylinder. The machine is equipped with oversize 22 in. diam wheels made of shock-resisting Mee-

hanite. Cleaning of the blade is provided by means of a high-pressure coolant stream as the blade leaves the cut.

The stock vise is hydraulically operated. Standard capacity is 10 by 10 in. and construction permits adjustment for a 45 degree cutting angle. The new device uses Milford Rezistor high speed steel band saw blades 1 in. by 15 ft. It weighs 3000 lb and uses a power source of 220 v ac, 60 cycles, 3 phase. The bar feed is optional, manual or fully automatic and a complete, integral recirculating system is included. *The Henry G. Thompson & Co.*

Circle 64 on postcard for more data

Parts Loader

PRODUCTION of a new automated parts loader that swings clear of the machine for tool change has been announced. Designed for Michigan's Model 1835 Shear-Speed gear shaper, the new-type loader can be adapted for all shear-speed machines in the 1800 series.

The loader feeds parts two-at-a-time from a two position index dial. Parts enter the feeder from an entrance chute then one part drops into a recess while mechanical fingers momentarily retain the second part. When released, the second part stacks on top of the first and from this point both parts are transferred to the index dial, indexed, machined and ejected as a unit.

The sequence of operation is: the index slide advances into position under the cutting head, the part locator, a hydraulically actuated arbor, is retracted below the level of the index plate. At the same time the index dial advances 90 degrees bringing the two parts into loading position. The part locator is then raised, entering the parts and positioning them for shaping. The locator has a predetermined length of time to enter the part, if entry is not completed the part is rejected. Then the index slide retracts, this same action moves a mechanical finger that pushes double-stacked parts from the entrance chute into the parts feeder. After the cutting cycle the index dial returns 90 degrees and the parts feeder slide advances to place another double part in the index dial and the index slide advances the index to accept part for ejection. The entire mechanism is pivot mounted so that it can be swung completely clear of the machine and pin-lock stops are provided for positive alignment. *Michigan Tool Co.*

Circle 66 on postcard for more data

Radial-Arm Machine

DESIGNED for the non-ferrous metal market, a new radial-arm machine has been introduced. Some of the design features are an adjustable front extension to the table top, a double acting control handle that simultaneously unlocks the arm while disengaging the locating pin for changes from cut-off to miter positions. Ripping from in-rip or out-rip positions is accomplished by the loca-

tion of a rip scale on either side of the arm.

An electronic brake stops the blade approximately 20 to 25 seconds after shut-off. The machine also features a 24 v control circuit and the new connector on the enclosed motor to change voltage connections. A dust tight switch box is incorporated to minimize fire and explosion hazards. *DeWalt, Inc.*

Circle 65 on postcard for more data



DeWalt Cutting Machine.

NEW PRODUCTION and PLANT EQUIPMENT

Stud Welding Gun



This small stud welding gun called the Nelson NS-10, was designed to weld all studs up through 1/2 in. in diam. The gun weighs less than four lb and is nine in. long. (Nelson Stud Div., Gregory Industries Inc.)

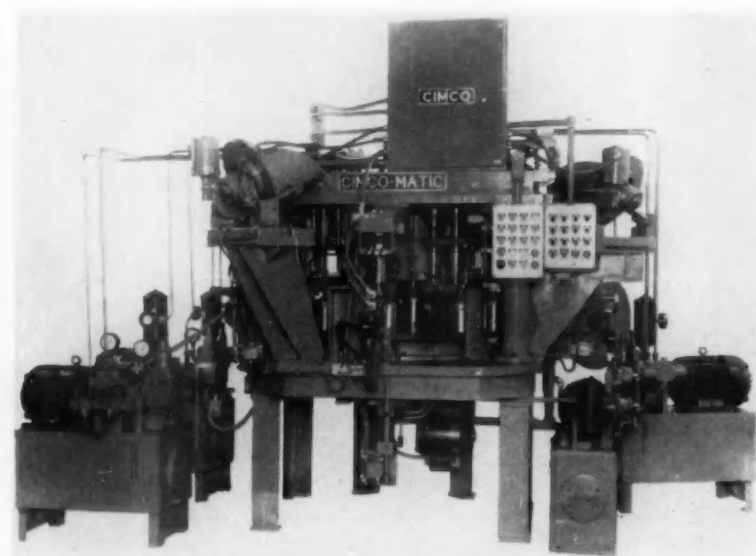
Circle 67 on postcard for more data

Weld Positioner Control

A HEAVY duty, precision, circumferential weld positioner control, built for use with automatic fusion welding machines is now on the market. The machine permits operation of a precision welding positioner and provides an uninterrupted circumferential weld.

The table rotation is accomplished by a d-c motor geared directly to the table. The table starting and stopping action is accomplished by an electrically operated clutch-brake. The table drive system permits the table to reach its maximum speed or stop in 3 cycles. The feedback control maintains a speed precision of $\pm 2\frac{1}{2}$ per cent at 60 rpm of the motor shaft, and $\pm \frac{1}{2}$ per cent at 1800 rpm of the motor shaft. This precision is directly proportionate, throughout the entire 30 to 1 ratio, with a maximum line voltage variation of ± 10 per cent. The input to the control is 220/440-v., 60 cycles.

Electrical controls for the positioner enclosed in a control station may be mounted in a position convenient to the operator. The control is so designed that it will operate any positioner driven by a d-c shunt wound motor. It is compact, and mounts on the rear of the welding positioner. The main motor control panel is quick disconnect—plug connected. The cabinet, built to JIC standards, is fan cooled and air filtered, and, includes a built-in fused disconnect switch, which is interlocked with the door. A remote control panel (operator's pendant), with multi-purpose control buttons, controls all operations of the positioner. Two speed-control potentiometers are



Cimco eight-station automatic assembly unit assembles heater armature cores

Machine for Assembling Car Heater Parts

CAPABLE of assembling up to 900 armature core assemblies per hour for automobile heater motors, the new Cimco automatic assembly unit is now available. The machine can assemble cores of varying stack heights of laminations and varying core shaft lengths. With minor changes the core shaft diameter may also be varied.

The eight-station machine is equipped with a 36 in. Cimco MDA-36LT-8 index table and is completely automatic. The feed units on this 4CA-54 machine are: two hopper feeds for shaft bushings, a magazine feed unit to handle shafts and two coil feed units which service the machine with insulating material which is cut and assembled in the machine.

The metal laminations, stamped out on other equipment located near the unit, are conveyed to three magazines from which they are fed into the assembly process. There are four separate hydraulic power units plus a separate control panel. Stack height is controlled by detectors on the steel lamination magazines which will stop the machine if the proper head of laminations is not maintained. A detector at Station 3 will also stop the machine if an out of tolerance stack height has been assembled. A probe at station eight will stop the machine should there be an uncleared fixture. Dimensions are, width, 106 in., overall depth, 84 in. and overall height, 110 in. Cimco Engineering Co.

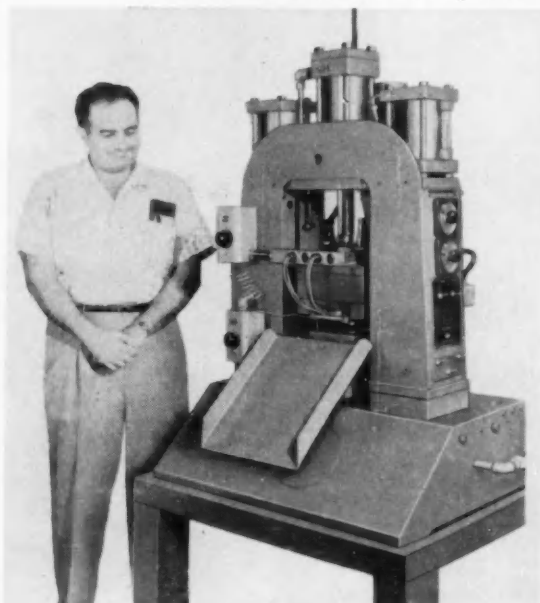
Circle 69 on postcard for more data

provided; a reverse speed standard potentiometer and a welding speed 10 turn micro-potentiometer. External to the motor, is an electric clutch brake. In automatic operation, the motor is pre-started, and then upon arc strike the clutch is operated to the start position. Acceleration takes place in 60 milliseconds. The circuitry provides for table tilt limit switches, a current decay limit switch, a weld start locator limit switch, limit switch selection of welding current values, and, for

automatic initiation of the positioner rotation by an automatic welding set-up. Other features of the motor control include an a-c motor starter, to operate the table tilt motor, a welding speed tachometer, calibrated in in. per minute, a field loss protective relay, reversing and dynamic braking, and, the customer and internal connections brought to a centrally located terminal strip. The Weltronic Co.

Circle 68 on postcard for more data

Ten-Ton Automatic Compression Press



This 10-ton capacity Automite A-10 compression molding machine with manual, semi-automatic and fully automatic controls was designed to solve the short run problem. It makes use of the airdraulic principle, with a normal working air pressure of 80 to 100 psi. A safety valve prevents over-stressing the mold frame which is an integral part of the machine and is capable of handling a 5 by 6 in. chase plate. The electrical system is mounted on one panel board. The entire machine is designed so that all parts are accessible for service. (Automatic Molding Machine Co.)

Circle 70 on postcard for more data

equipped, respectively, to accept 110, 220 or 440 V electrical input power. The 440 V model is equipped with a transformer to convert the power supply to 110 V current. The drive motor is a constant speed ac type nominally rated at 1½ hp. It is available as either a 110 to 115 V, 60 cycle or 220 V, 60 cycle, single phase type. The hydraulic pump is a positive displacement, pressure loaded, gear type and is directly coupled to the motor shaft. *Huck Mfg. Co.*

Circle 72 on postcard for more data

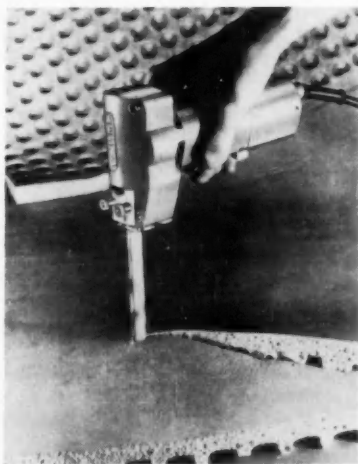
New NEMA Motors

THE U. S. Uniclosed motor is now available in new NEMA ratings up to 50 hp, according to a recent announcement. It features rugged construction, advanced electrical design, and savings in space of as much as 46 per cent. Construction details include new drip-proof design for greater protection against environmental hazards, a two-way ventilation system for uniform cooling of the motor, Ventrifoil for efficient direction of air and deflection of water, improved asbestos insulation of windings, and a dynamically-balanced, solid cast rotor for smooth operation. *U. S. Electrical Motors, Inc.*

Circle 73 on postcard for more data

Foam Rubber Saw

USING two blades which move in opposite directions, a new electric cutter is designed for easy cutting of foam rubber and similar materials such as plastic foam, rubberized horsehair, etc. Motor is universal



LESTO GEQ2 foam rubber cutter

type, operating on both ac and dc. Blades are available for materials of 5¼, 8 and 11¼-in thickness. Light in weight, the cutter can be operated in one hand. *Victor J. Krieg, Inc.*

Circle 71 on postcard for more data

Portable Power Cell

BUILT to JIC standards and consisting basically of an electric drive motor, hydraulic pump, filter cooling system and relief valves, is a new two-pressure hydraulic power cell that permits installation of Huckbolt fasteners with maximum interference fit. Designated Series 700 Power Cell, it is to be used with the Huck Model 607 which was made for double-driving applications of commercial or aircraft fasteners.

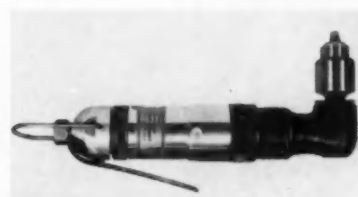
The tool is set initially for low pressure operation. At this setting, it is used to pull the fastener through the hole and bring the faring surfaces into positive contact with one another. The operator then actuates a switch on the gun for selection of full working pressure which is used to actually set the fastener with design tensile preload, swage the locking collar in place and break off the fastener pintail.

It is designed with two separate system relief valves. The low pressure circuit is adjustable between 600 and 1800 psi in the standard design. Pressure adjustment is by stem control of the low pressure relief valve setting. The high pressure relief valve setting is fixed at 3000 psi to provide the necessary high working pressure for driving the fasteners.

It is available in three models

Close Quarter Drill

DESIGNED for drilling in close quarters, a new angle air drill has just been announced. The new Keller Tool 11G-2 Series drill has a heavy-



Gardner-Denver angle air drill.

duty spiral bevel gear drive. Gears and drive spindle are ball-bearing mounted. It also offers interchangeable gears, spindles and chucks and one-shot lubrication with flush type fitting. Capacities up to 5/16 in. The new tool has a torque and speed range, from 500 to 17,000 rpm. The body diam is 1½ in. *Gardner-Denver Co.*

Circle 74 on postcard for more data

Need special-purpose wire or steel?

Whether it's manufacturing special wire and steel to your specifications, or working with your engineers to develop new types to solve new problems, you can always count on National-Standard for something extra . . . in quality control . . . in product uniformity . . . and in service! Not just an idle boast. We've been doing it that way for over 50 years . . . and would like very much to prove it to you.

Check these N-S products

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Tire Bead Wire002" to .125" Diameter
Stainless Steel Wire015" to .125" Diameter
Music Spring Wire002" to .110" Diameter
High Carbon Steel Wire008" Minimum Rope Diameter .080"
Fine Wire RopeUp to 1" Wide
Braided Wire—FlatUp to 24" Diameter
Braided Wire—TubularUp to 24" Diameter
Static Braids—Ferrous and Non Ferrous Copperply Wire Up to .250" Diameter
Nickelply (Electro nickel plated steel wire)Up to .340" Diameter
Electro Brass Plated Steel Wire Up to .340" Diameter

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High Carbon Spring and Specialty Steel Strip
Flat Wire Cold Rolled, Annealed, or Tempered—Blue, Straw, Bright, or Commercial

Scaleless Width:	Maximum—Tempered	6 1/2"
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Thickness:	Minimum015"
	Maximum065"
Other Specialties:	Minimum001"
	Maximum375"

Stainless:	Cold Rolled025"
	Maximum Width	1"
	Maximum Thickness025"
	Maximum Width025"

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WORCESTER WIRE DIVISION

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Worcester, Massachusetts
Phone: 2-2871

Fine Wire: Diameter .002" to .075"
Stainless
High Carbon
Low Carbon
Monel
Galvanized
Tinned
Cadmium Plated
Music Spring Wire: Diameter .002" to .250"
Copperply Wire: Diameter up to .250"
Flat Wire: Maximum .125" Wide
Maximum .060" Thick
Nickelply (Electro nickel plated steel wire): Up to .250"
Electro Brass plated steel wire: Up to .250"

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Wire Cloth
Carbon and Stainless Steel—Non-Ferrous—Copperply
Plain WeaveUp to 300 Mesh } in suitable metals
Twill WeaveUp to 300 Mesh }
Dutch WeaveUp to 500 Mesh }
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WAGNER LITHO MACHINERY, Bensenville, Ill.; metal decorating equipment • ATHENIA STEEL, Clifton, N. J.; flat, high carbon spring steels • REYNOLDS WIRE, Dixon, Ill.; industrial wire cloth

Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Ball Lock Punches 1

Ball Lock interchangeable punches and die buttons plus retainer plates and die sections are discussed in detail in a new 66-page catalog. *Acme Industrial Products.*

Sealed Cylinders 2

Features of a new all-Teflon sealed hydraulic cylinder are presented in a two-color brochure. The eight-page booklet includes design data and specifications. *Flick-Reedy Corp.*

Scale and Rust Remover 3

Oakite Drycid, the recently introduced powdered acid scale and rust remover is described in a two-page service report prepared by *Oakite Products, Inc.*

Steel Tubing 4

Booklet IA-6, 12 pages, depicts some of the applications of seamless and electric resistance steel tubing. *Ohio Seamless Tube Division of Copperweld Steel Co.*

Electrical Products 5

Electrical products and fastening devices are the topics of Catalog 12-B. The 38-page publication contains and describes over 400 items including plastic screw anchors, Bakelite and porcelain wire connectors, plastic clamps and straps and other related products. *Holub Industries, Inc.*

Bright Heat Treatment 6

Standard rated gas-fired muffle furnaces are described in Bulletin SC-179, four pages. Field tested applications for bright heat treatment and brazing of special steels and non-ferrous metals are included. *Surface Combustion Corp.*

Industrial Tubes 7

Characteristics of vacuum power tubes, beam power tubes, rectifiers, thyratrons, magnetrons, mercury vapor rectifiers and ignitrons are presented in a new booklet entitled, "Industrial Tubes." Maximum ratings of these types are included. *Sylvania Electric Products, Inc.*

Gas Blender 8

Bulletin GB 8-57-2M gives information on a new gas blender. Dimensions of the machine and data on its thermal conductivity cell and gas mixing chamber along with a schematic diagram are included. *Gow-Mac Instrument Co.*

Spring Washers 9

More than 1000 different sizes of washer dies are listed in a new bulletin. The list includes blanking and punching dies for making flat, cupped, curved, wavy, slotted and belleville spring washers ranging in size from 0.125 to 4.735 in. OD. *Associated Spring Corp.*

(Please turn page)

10/15/57

VOID After Dec. 15, 1957

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Multiple Spindle Tools 10

A new 24-page book entitled "Automation in Assembly" discusses the application, design and related features of multiple spindle tools. *Thor Power Tool Co.*

Pinch Jaw Chucks 11

Automatic pinch jaw chucks designed for the machining of jet engine discs and rings are described in a new three-page bulletin published by *The Cushman Chuck Co.*

Electroplating 12

A full line of anodes, anode accessories and chemicals for electroplating and metal finishing is presented in 12-page Bulletin AC-110. *Hanson-Van Winkle-Muning Co.*

Stainless Fasteners 13

Details on 37 different types of standard fasteners are shown in an eight-page guide including sizes, heads, threads and grades of steel. *Allmetal Screw Products Co.*

Carbide Catalog 14

Catalog TTI-57, 56 pages, lists dimensions, applications and ordering data for the complete line of carbide tips, tools, and inserts offered by *Firth Sterling Inc.*

Metal Straighteners 15

A line of straighteners for flattening ferrous and non-ferrous sheet or strip are divided into four types and explained in 12-page catalog 820-T-5. *The Waterbury Farrel Foundry & Machine Co.*

Milling Machine 16

The new three dimensional milling machine designed by Sundstrand is described and illustrated in a five-page circular. Horizontal, vertical and cross feed are controlled simultaneously on the machine by means of a three-dimensional tracing valve. *Sundstrand Machine Tool Co.*

Bending Machines 17

Catalog 356 contains over 90 illustrations of bending machines showing over 65 different applications in bending tubing, pipe, extrusions and rolled sections. Complete specifications are given for all standard models, including the maximum size tubing, angle, and channel that can be bent on each machine. *Pines Engineering Co.*

Rubber Products 18

Recently prepared, an 11-page catalog describes facilities available for manufacturing rubber parts to customer order. Included in the catalog are descriptions of natural rubber and synthetics and a guide to ordering rubber products. *The Williams-Bowman Rubber Co.*

Production Control 19

Information on production control through automation is contained in a new brochure published by *Patterson-Emerson-Comstock, Inc., Automation Division.*

Machine Tool Catalog 20

Band saws, circular saws and drill presses are among a complete line of light-heavyweight machine tools described in detail in a new 48-page catalog prepared by *Walker-Turner Division, Rockwell Mfg. Co.*

Spin-Lock Screws 21

Principles and applications of spin-lock screws are detailed in a new four-page bulletin published by *Pittsburgh Screw and Bolt Corp.*

Cylinder Tubing 22

Bulletin R7A, three pages, describes Rockrite cylinder-finish tubing which is used for cylinders and other applications which require a smooth close tolerance I.D. *Tube Reducing Corp.*

Sheet Handling 23

Automatic systems for handling ferrous or non-ferrous plate and sheet are described in Bulletin B 500, 16 pages. Basic applications for automatic handling systems, and descriptions of typical floor-rail and radial-transfer systems are included. *Noble Co.*

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How to squeeze out
more payload
on 50,000 pounds
of oranges . . .

This new bulk fruit trailer, by Miller Trailers, Inc., Bradenton, Florida, uses 36-foot long Bridgeport Aluminum Extrusions as upper rail sections. Because the trailers carry 50,000 pounds of oranges at one time, these rails have to be strong. They're light in weight, too, and that means more oranges can be carried per load between grove and concentrate plant.

Construction like this with Aluminum Extrusions pays for itself in more payload and lower maintenance because aluminum is not only light and strong, but corrosion resistant and easy to clean.

These rail sections are one of many Bridgeport shapes designed especially for truck and trailer construction. A complete line of these shapes is available without die charge.

Whether you build or operate trucks and trailers, Bridgeport Aluminum Extrusions can help you increase payloads, reduce maintenance and get a stronger, more rugged construction.

The Bridgeport Aluminum man in your locality is always ready to help you use aluminum extrusions to best advantage. Call him today.



NEW BRIDGEPORT EXTRUSIONS BOOK—Write on your business letterhead for a copy of this comprehensive manual on aluminum extrusions, alloys, properties, limits, tolerances, joining, fabricating information, etc., including full-size drawings of Bridgeport's complete line of truck and trailer shapes.



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Aluminum Extrusion and Forging Facilities at Adrian, Michigan
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News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Machine Tool Orders Declined in August

According to the latest report issued by the National Machine Tool Builders' Association, total new orders for machine tools amounted to about \$48.8 million in August, as compared to the \$59.25 million July total. Equivalent net new orders (after downward adjustments for order cancellations) totaled about \$44.6 million for August versus \$55.5 million for July. While August operations show a drop-off in the upswing which occurred during the months of June and July, the August result is about eight per

cent better than the low 1957 May figure of \$41.4 million net.

Value of shipments, on the other hand, increased in August to about \$63.5 million from the July total of \$58.7 million. Current estimated order backlog is 4.1 months versus the prior 4.2 months.

Large Contour Lathe Ordered by Inland Steel

Inland Steel Co. has ordered from the Mackintosh-Hemphill Div. of E. W. Bliss Co. what is reputed to be the world's largest electronically-controlled contour roll lathe. The lathe, of nominal 60-in. swing and 25 ft between

World's Largest Electronically-Controlled Contour Roll Lathe, Now Nearing Completion, Will Handle Rolls Up to 75 Tons

centers, will have a Voss-Raytheon electronic follower control mechanism which is said to be so sensitive that it can duplicate the contours of a master template within 0.001 in.

The machine will be used for dressing back-up rolls and turning structural rolls. It will incorporate a number of design features to facilitate setups and changeovers and to provide the power needed to turn rolls up to 75 tons. Equipment will include a power-traversed tailstock and power-traversed neck housings having hydraulic locking clamps. Its main motor will be rated at 150 hp.

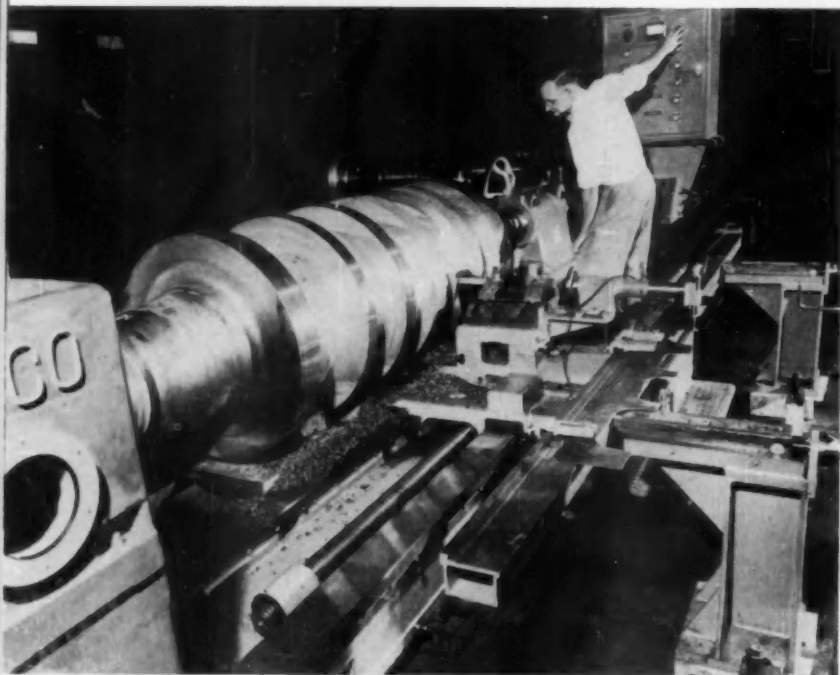
Inland Steel's first Mackintosh-Hemphill electronically-controlled contouring lathe, a 48-in. model, was delivered to the Indiana Harbor Works in 1955. The new and larger 60-in. machine is scheduled for delivery this fall.

Two additional large automatic roll contouring lathes will soon be delivered to other steel mill roll shops.

Futurmill Makes Ties With Baldwin-Lima-Hamilton

Futurmill, Inc., Pontiac, Mich., has announced that the manufacturing rights for the Futurmill structural milling machine have been sold to Baldwin-Lima-Hamilton Corp. Exclusive sales distribution of the machine (now named the Baldwin-Futurmill) will be retained by Futurmill, Inc., in conjunction with its line of indexable blade milling cutters, power spindles and loadmeters.

This move is said to have been made to better meet the demands of the structural steel industry for high-speed-production milling equipment.



New 60-in. Mackintosh-Hemphill electronically-controlled contouring lathe will shortly join this 48-in. model at Inland Steel's Indiana Harbor Works

Wilco Machine Tool Co. Moves to New Plant

The relocation of Wilco Machine Tool Co., Inc., producers of tools, gages, jigs, fixtures and special machines, has been announced. The transfer from Manchester, Conn., to the new plant on Route 6 in Bolton, Conn., was recently completed.

Standard Pressed Steel Using Wean Machines in New Coil-Processing Line

Part of a \$1.8 million modernization and expansion program at Standard Pressed Steel Company's Hollowell Div. is a new high-speed, coil-processing line. This line, costing \$330,000 and scheduled for completion this month (October), will provide streamlined facilities for the manufacture of Hollowell steel shop equipment, shelving, etc., from large coils rather than sheet stock.

The new machinery was produced by Wean Equipment Co. The 210-ft line will include a high-speed, high-capacity slitter for reducing wide coils down to the smaller sizes needed for specific components. As raw material the equipment will use coils of steel 48-in. wide, weighing up to 30,000 lb. The setup will also include a Wean 200-ton Flying Press.

Units of the line can be operated singly or in sequence. Large coils can be slit and the smaller resulting coils then recoiled for later use. Slit coils, in widths from $\frac{5}{8}$ to $7\frac{1}{2}$ in., can be edge-conditioned and recoiled. Or the coil steel can be slit, edge-conditioned if desired, and fed continuously at up to 300 fpm into the Flying Press for shearing, blanking and piercing operations. The press operates at up to 200 spm for 18-in. feed lengths, with work done "on-the-fly" while dies and strip are both in continuous motion. Steel shelves up to 48 by 36 in. can be sheared, blanked and pierced with one sliding stroke. Skip sequencing of die stroke permits the press to turn out larger sheet sizes.

SPS expects with this new coil-



This group of three Roto-Flo machines produces the splines on all axle shafts for the five lines of Chrysler Corp. automobiles. Developed by Michigan Tool Co., they cold-roll the splines into the shafts. The rolled splines are said to be stronger and smoother (under five microinches) than formerly. Output of the group is over 1000 shafts per hour. The tools which form the splines have to be sharpened only once every 100,000 or more shafts.

processing line to achieve a reduction in scrap up to 50 per cent, increased flexibility of operation, and fabrication of components at rates two or three times as fast as with conventional equipment.

New Tool Lease Rules Due for Early Issue

Standardized rules covering Government machine tool leasing policies have been drawn up and are likely to be placed into effect very soon, according to reports at press time. Top officials of the Office of Defense Mobilization are reviewing the regulations, which will tie in with uniform leasing rates set this summer, and early approval is anticipated barring unforeseen complications.

The new regulations, which apply to both defense and non-defense leasing, are primarily intended to provide uniform rules to be followed by all Government agencies leasing machine tools. They cover such phases as purchase and renewal options, installation, permissible uses of leased Government tools by industry,

maintenance, transportation, etc.

There have been implications that prior non-uniform leasing rates and varying policies have given some companies competitive advantages. Recommendations for uniform leasing policies, as well as standard rates, for all Government tool-leasing activities came from a special inter-agency task force last spring. The new regulations contain all of the committee's recommendations but one. That has to do with the placing of fees in a special fund to finance tool modernization and replacement, which requires congressional action. Legislation will be pending to accomplish this when Congress reconvenes in January, and ODM spokesmen say they will support it.

Lap Seam Welder Processes Alloy Strips

Continuous processing of aluminum alloy strips is being done at the Alcoa, Tenn., plant of Aluminum Co. of America with a special lap seam resistance welder. De-

(Continued on page 146)

Curon's Properties and Applications

CURON, a new family of materials for industry developed by the Curtiss-Wright Corp. has many applications in the automotive and aviation industries. Having high anti-noise properties, it is especially applicable for use in the interior of passenger cars. Snap-in headliners, crash padings, seats, firewall and underhood insulation and bonded floor rugs can be fabricated from Curon. Its use in aircraft results in greater payloads. By using the

new Curon seat cushioning in its fleet of Douglas transports, Scandinavian Airways System is said to have saved enough weight to provide for \$1000 worth of added payload per flight.

Another recent development of Curtiss-Wright is a sound screen which has been designed to reduce noise at airports, overhaul facilities and similar locations.

Evaluation tests show Curon to be resistive to solvents, chemicals and mild alkalies and acids. It retains (or fully regains) its cushioning and strength properties even after long immersion in commonly encountered hazards such as petroleum or vegetable oils. It is resistant to soap and water and detergent solutions, but is not recommended for use in concentrated acid and alkali solutions. It has open, interconnecting and good breathing structures even in the fine textured formulations. This permits continuous air circulation and rapid drying.

Curon has a tensile strength of 18 to 45 psi in densities from two to five lb per cu ft. Tear strength is 6 to 10 psi and elongation at the breaking point ranges from 125 to 600 per cent. It shows no loss of tensile strength after 1/4 million flex cycles, compressed to 50 per cent of its original thickness (Fig. 1).

Curon supports a given load in a stable manner by exerting somewhat less restoring force than

that imposed by the initial load. This property, controlled resilience, can be modified by formulation or special fabrication methods for many requirements. At two to five lb density per cu ft it has a 25 to 30 per cent rebound. The elimination of this "fight back" or bounce made possible by the lower restoring force accounts for much of the comfort inherent in Curon and makes it especially suited for use in "crash pads" or dashboard padding.

Acoustical tests were conducted with the results shown in Fig. 2. In small rooms with bare plaster ceilings and Curon installed above the wainscoting and on door panels only, 1/4 in. thick Curon sharply reduced both reverberation within the room and sound transmission between adjoining rooms (Fig. 3). Besides being an excellent sound insulating material, Curon is also a good heat and cold insulator. It is comparable to rockwool, cork and polystyrene foam. It maintains flexibility over a wide temperature range (Fig. 4) and does not pack like loose materials. The new product offers little resistance to X-ray, radar or radio waves, making it suitable for environmental cushioning and thermal/acoustical insulation of this family of equipment. It will not build-up nor hold surface static charges and it retains its electrical properties over a wide temperature range.

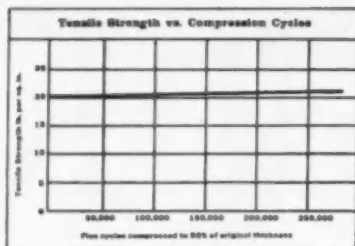


FIG. 1

Sound Transmission Adjoining Rooms (1000 c.p.s.)		
	Decibels less in intensity	Decibels improvement
Painted Walls in Both Rooms	23	
CURON in Sending Room Only (1/4" Curon tile)	44	11
CURON in Receiving Room Only (1/4" Curon tile)	41	8
CURON in Both Rooms (1/4" Curon tile)	47	14

FIG. 2

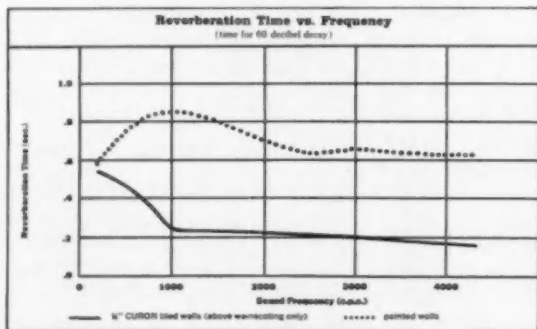


FIG. 3

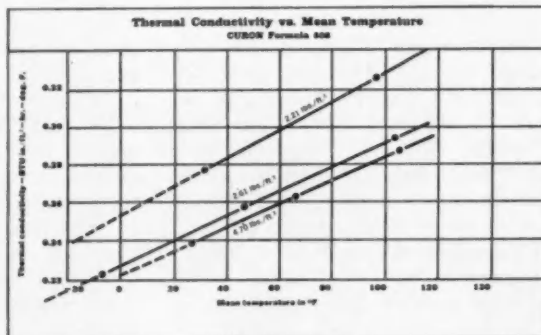


FIG. 4



Now you can get highest capacity at lowest cost with Torrington Needle Rollers

A hardened shaft, a hardened housing, and precision Torrington Needle Rollers provide the most economical, highest capacity anti-friction assembly you can obtain.

Six roller end shapes permit design flexibility whether the requirement be maximum effective roller length, proper fillet clearances or greater lip retainment. Torrington Needle Rollers are available in a complete line meeting SAE and AFBMA specifications. Torrington standards for material, heat treat, tolerance and finish of Needle Rollers are the highest in the industry.

Operating results with Needle Rollers depend on careful design of mating parts. Torrington's Engineering Department, with extensive experience in Needle Roller application, will be glad to give you technical advice on your needs. *The Torrington Company, Torrington, Conn. — and South Bend 21, Ind.*

TORRINGTON BEARINGS

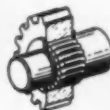
District Offices and Distributors in Principal Cities of United States and Canada

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS • THRUST

AUTOMOTIVE INDUSTRIES, October 15, 1957



Full complement of small diameter rollers insures maximum number of contact lines in load zone for high radial capacity in minimum space.



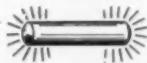
Mounted without races between hardened shaft and hardened housing (RC-60 recommended), Torrington Needle Rollers allow largest possible shaft diameters.



Carefully hardened, ground and lapped high carbon chrome steel makes each Torrington Needle Roller a precision part for long life performance.



Close tolerances are assured by stringent quality controls. Standard OD tolerance is .0002", but Torrington Needle Rollers can be supplied with tolerance of .00005". Tolerance on length depends on end shape.



Fine finish reduces friction to a minimum. Torrington Needle Rollers are usually polished to 4-6 rms, but finishes as fine as 1-3 are available on special order.

AIR BRIEFS

By RALPH H. McCLARREN

Missiles Vs. Manned Aircraft

Guided missiles will play an increasingly great part in the combat potential of all large nations. A few misguided prognosticators have predicted the missile will soon displace the manned aircraft as a weapon defense system.

According to Orval R. Cook, president of the Aircraft Industries Association of America, the U. S. Air Force has indicated that ultimately 90 per cent of all air defense missions will be handled by missiles. Also that 50 per cent of the Strategic Air Command's job and 30 per cent of the Tactical Air Command's job will be taken over by missiles. The U. S. Navy expects that within five years, 35 to 40 per cent of its total expenditures for aviation products will be for missiles.

Missile business is soaring. In six years expenditures have increased from \$21 million per year in 1951 to \$2 billion per year in 1957. An understandable reason why the several Armed Services have been maneuvering for a large proportionate share and control of missile development and production.

There are currently 33 missile developments—several of them now in high quantity production. Of the 33 missiles, the aircraft industry has prime contracts for 24. Electronic firms, automobile manufacturers and other industries are the contractors for the other nine missiles.

Increasing emphasis on missiles means decreasing procurement of manned aircraft. This will effect important readjustments in the

aircraft manufacturing industry. Already affected is the sub-contracting activity. Companies will do more of the work themselves and farm out less of it to sub-contractors.

Giant Altitude Chamber Used to Test Jet Aircraft

Secured inside a test facility at Phoenix, Arizona, the cabin and equipment of a McDonnell F-101B, 900 mph plus, Air Force plane has just completed 180, eight-hour shifts, 1240 hours, of testing at altitudes up to 50,000 ft and at temperatures from 65 F below zero to blistering heat. Equipment under test in the cabin included the plane's "black box" brains, its radar and electronic components and the AiResearch built heating and refrigeration system.

The project was undertaken by McDonnell Aircraft Co. with the cooperation of AiResearch Manufacturing Division of The Garrett Corp. Of special interest was the development of techniques to simulate airborne testing to save lead-time, guarantee better aircraft performance and save costs. It is reported the cost of the test is a fraction of the \$10,000 per hour cost of airborne testing.

NBAA Safety Awards

Highlight of the National Business Aircraft Association's 10th annual meeting was the presentation on October 4th in Denver of awards to pilots with outstanding safety records in business flying.

Forty-three were recognized for having flown one million or more

miles in business aircraft without accident or injury. Greatest "million miler" was Nelson U. Rokes, chief pilot for The Procter and Gamble Co. of Cincinnati, who has flown 2,986,560 accident-free miles. J. Ralph Seidner, of the Goodyear Tire and Rubber Co., had the next highest number of safety miles—2,026,500.


Eighty-eight business pilots who had flown 500,000 or more accident- and injury-free miles also received NBAA's safety award certificates. Of the 88, Walter C. Pague, pilot for Armco Steel Corp., Middletown, Ohio, almost made the one-million-mile category. He flew 993,000 accident-free miles. Next in line was Morris J. Morgan, of the Texas Eastern Transmission Corp., with 983,200 accident- and injury-free miles.

It is of interest to note the 131 honored pilots represented a total of 115,853,845 miles flown in business aircraft with not a dent to the aircraft or a scratch to their passengers.

Bonded Construction Superior to Riveted Assemblies

Fairchild Engine and Airplane Co., Hagerstown, Md., claims many advantages in the use of Redux bonded assemblies in making their F-27 propjet transport plane. Redux is the trade name of Aero Research, Ltd., and is claimed to be one of the strongest adhesives in the world.

Approximately 54 per cent of the total area of wings, fuselage and tail surfaces of the F-27 are made up of almost 400 bonded assemblies. (Turn to page 120, please)



CWC
*castings
help ease
your*

PROFIT
SQUEEZE

campbell,
wyant and
cannon

FOUNDRY COMPANY

DIVISION OF TEXTRON INC.

Muskegon, Michigan



Let overall savings gained through the use of Campbell, Wyant and Cannon castings help you release the pressure of the profit squeeze! CWC's modern facilities and advanced engineering techniques produce grey iron, alloy iron and steel castings of uniform high quality—castings that machine easier, wear longer, add to product dependability, without premium cost!

Spectrographic analysis, radiographing by million volt X-ray, pre-production planning and tests—all a part of your assembly team. Rely on CWC's creative metallurgical engineering . . . quality control of metals . . . and mechanized production facilities to help you hold production costs down, make your product even more saleable!

Write for the "One Source" story today . . . it's the informative booklet that shows why CWC should be the one source for all your casting needs.

SIX FOUNDRIES LOCATED IN MUSKEGON, LANSING AND SOUTH HAVEN, MICHIGAN . . . READY TO SERVE YOU!

The BUSINESS PULSE

Tapering Off of the Capital Goods Boom, which Until Recently Had Been an Important Factor of Dynamism in the Economy, Seems to Indicate That the Spending Curve Has Flattened Out and That a Plateau Has Now Been Reached.

Incoming reports have continued to be of mixed character, with the result that earlier uncertainty as to the business outlook has been extended. Still uppermost in almost everybody's mind is the question whether the economy is approaching a cyclical turning point.

Developments in the stock market reflect this situation. During September investor behavior was markedly cautious, so that each time rallying tendencies appeared they were quickly checked. At this writing the Dow-Jones indus-

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

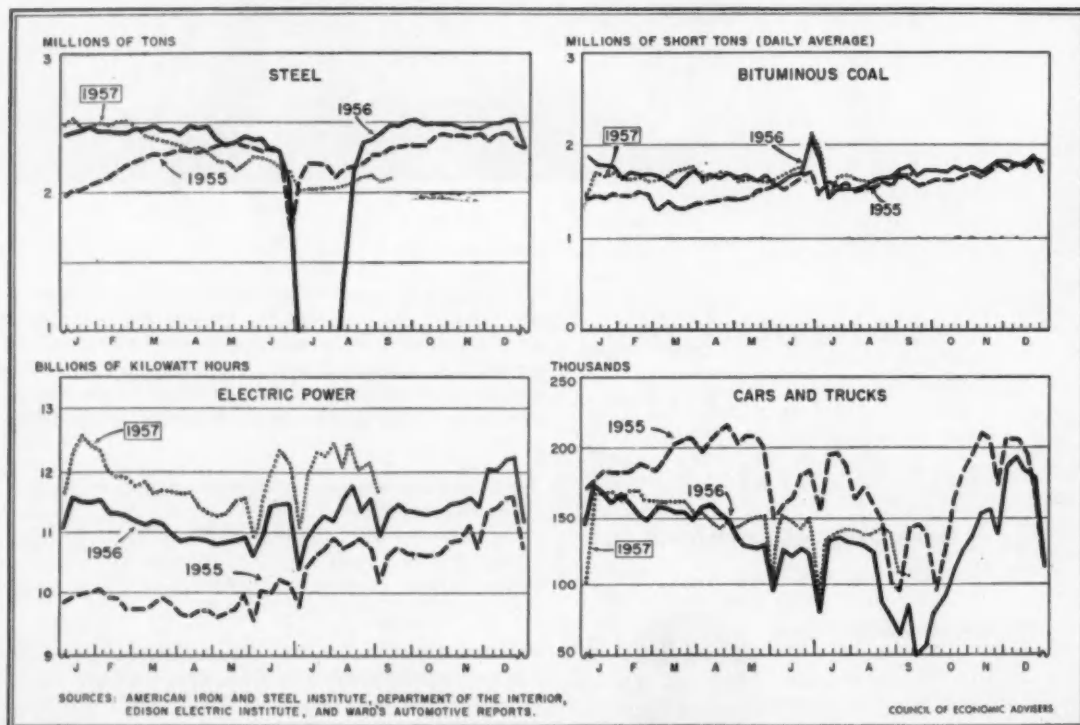
trial average is a full fifty points below its July peak.

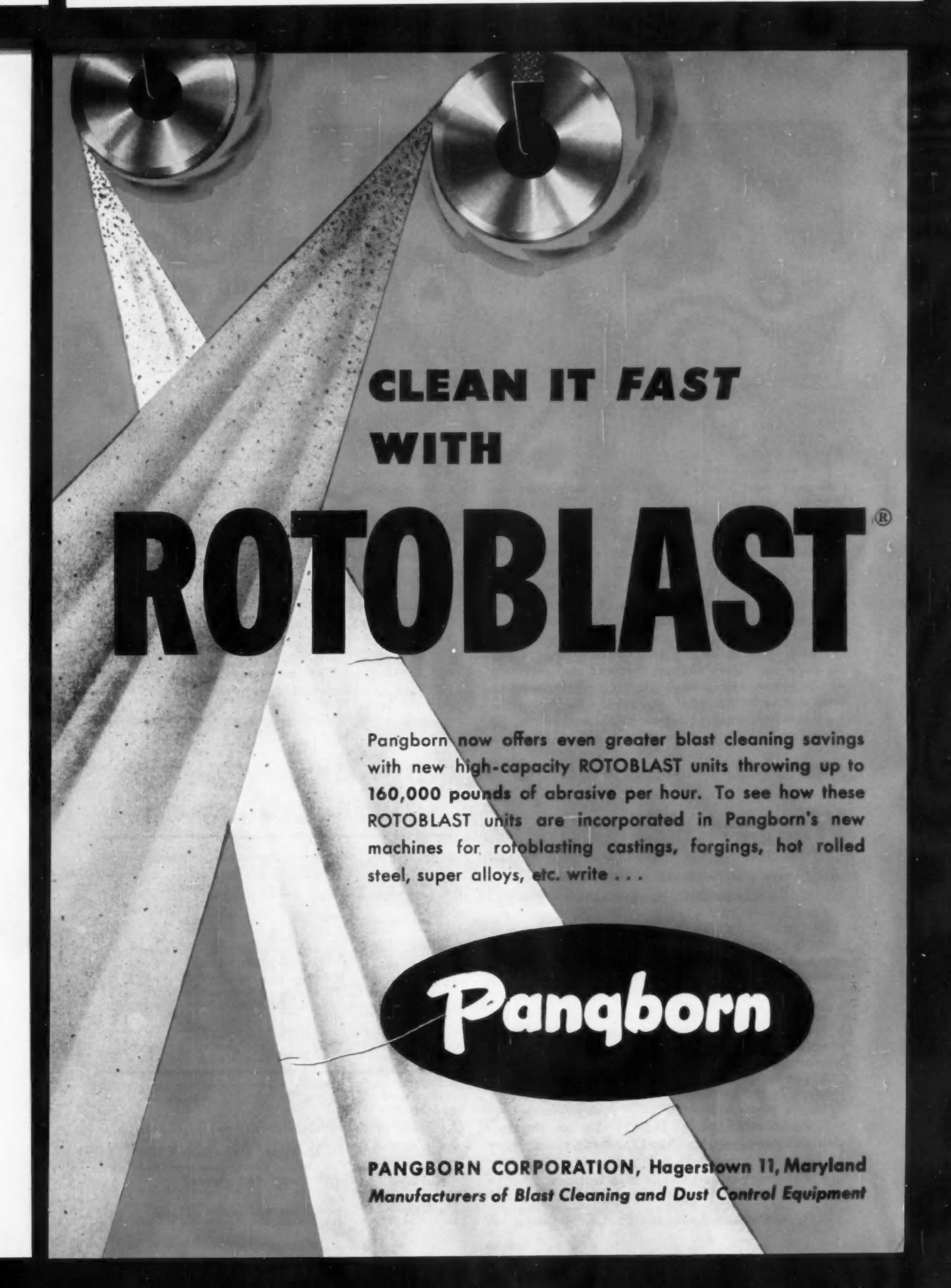
The behavior of stock prices may have been conditioned by the failure of early clear-cut signs of an autumnal upturn to emerge. Steel production in September did nothing more than inch ahead of

its depressed summer levels, whereas marked improvement had been expected by some producers. Nor did bank loans, which generally begin in show a well-defined uptrend after midyear, register any significant rise. Moreover, crude petroleum output continued to decline, reflecting, among other things, slow response to the President's request for voluntary import cutbacks. And reports of further production cutbacks and layoffs in the appliance industry were a sobering factor.

(Turn to page 130, please)

WEEKLY INDICATORS OF PRODUCTION





CLEAN IT *FAST*
WITH

ROTOBLAST[®]

Pangborn now offers even greater blast cleaning savings with new high-capacity ROTOBLAST units throwing up to 160,000 pounds of abrasive per hour. To see how these ROTOBLAST units are incorporated in Pangborn's new machines for rotoblasting castings, forgings, hot rolled steel, super alloys, etc. write . . .

Pangborn

PANGBORN CORPORATION, Hagerstown 11, Maryland
Manufacturers of Blast Cleaning and Dust Control Equipment



Deluxe version of the Taunus 17 M two-door sedan

The New 17 M TAUNUS

THE new 17 M Taunus introduced by Ford of Cologne, Germany, is made in two door and four door sedan versions and as a two door station wagon, all three body types being available in standard and Deluxe models. There is a wide choice of transmissions. As an optional extra the standard disk-type clutch can be replaced by the Saxomat automatic clutch developed by the firm of Fichtel & Sachs and already used by DKW. This consists of a standard single dry disk plate clutch with gear shift lever actuation through an electric switch connected to a valve which controls a vacuum-operated servo piston for declutching, foot accelerator pedal controlled, vacuum operated reengagement of the clutch and a centrifugal clutch for pick-up from engine idling speed. The three-speed transmission now has synchromesh on first speed as well as second and third, and the Borg Warner overdrive,

built under license by the former automotive firm of Adler in Frankfurt, is available for the first time on a German-built car. As on the smaller Taunus 12 M and 15 M models a four-speed transmission with three synchronized speeds is optional. The German branch is the only Ford division offering a four speed transmission for passenger vehicles.

The front suspension used on the 12 and 15 M models has been discontinued, and the Mac Evoy suspension, employed with success on the British Consul, Zephyr and Zodiac as well as on the Simca Vedette, has now been adopted by Cologne as well.

The four cylinder engine has a bore of 3.31 in. and a stroke of 2.99 in., giving a displacement of 103.6 cu in. Maximum power has been increased moderately to 67 bhp gross (59.2 bhp net at 4250 rpm), and maximum net torque is 95 lb ft at 2200 rpm.

What Price Executives?

By Harvey L. Thomas, Jr., McKinsey & Co., Inc.
MANAGEMENT CONSULTANTS

1956 was not a cheerful year for the automotive parts industry. Serious drops in volume of sales and profits resulted in improved performance only in about half the cases for the companies that comprise the industry. For those interested in compensation, 1956 results afford an opportunity to analyze the compensation—profits equation in an unfavorable climate. For the automotive parts industry, some interesting characteristics have emerged:

1. The belief that the industry as a whole is dependent on the fortunes of the major vehicle manufacturers seems supported.

2. Profits still appeared to be the key to compensation performance as has been the case in recent years of increasing trends of sales and profits.

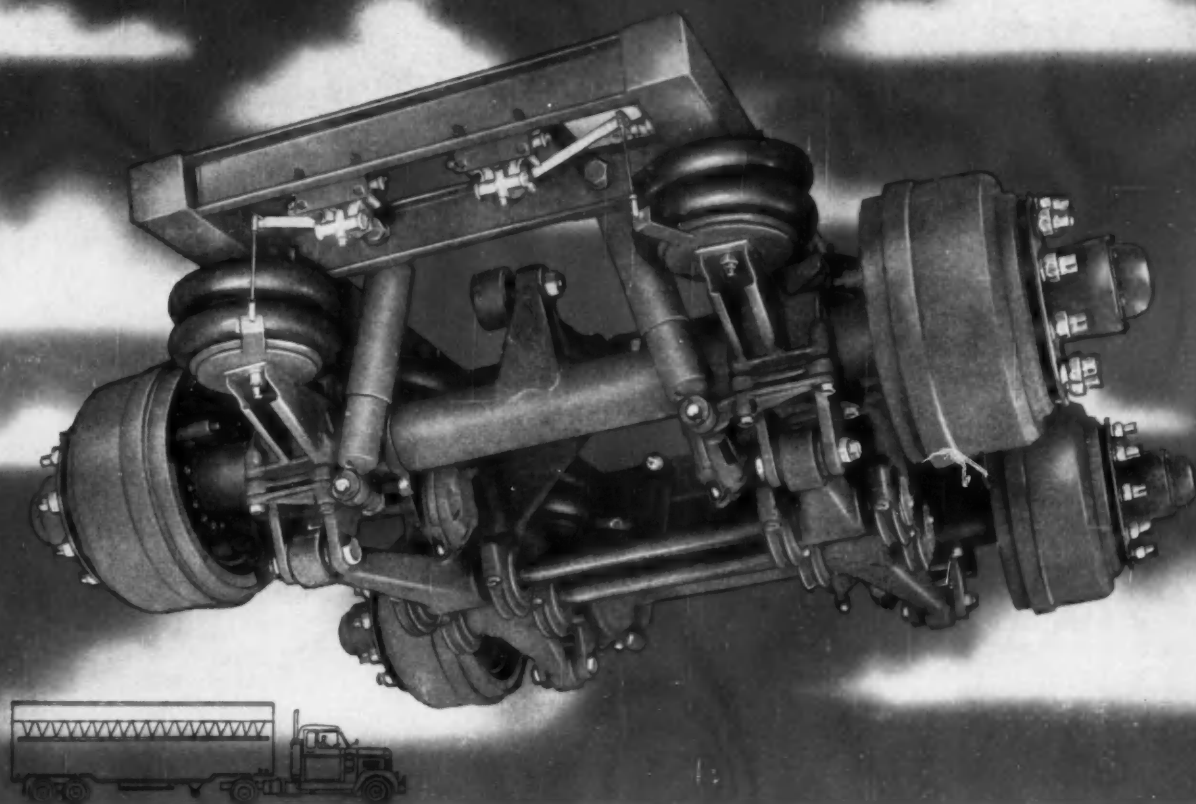
3. But penalties to executives in instances of poor

SUMMARY OF 1956 RESULTS IN 18 KEY INDUSTRIES

Industry	Average Percentage Increase or (Decrease) from 1955 Chief Executive's Compensation	Industry Sales	Industry Profits
Aircraft Manufacturing	1.3%	15.5%	1.8%
Automotive Parts Manufacturing	(1.1)	2.8	(6.8)
Building Materials	3.6	8.2	7.7
Chemicals	2.4	9.8	0.4
Electrical Equipment	2.2	15.4	3.2
Food	4.4	3.3	9.5
Machinery, Heavy	4.8	16.1	10.3
Machinery, Light	4.2	17.6	10.9
Non-Ferrous Metals	9.1	8.3	18.6
Paper and Paperboard	3.2	19.2	15.8
Petroleum	6.2	17.6	13.3
Public Utilities	6.9	8.7	8.9
Railroads	4.3	4.0	(3.8)
Retail Chains	(2.4)	8.2	7.3
Department Stores	0.2	7.4	7.0
Steel and Iron	9.0	7.6	(1.8)
Textile	(6.0)	6.8	(20.5)
Tobacco	(0.1)	3.5	7.8
Average	5.1%	11.0%	10.0%

company profit performance did not appear to be as proportionately great as rewards have been in the past.

(Turn to page 102, please)



TONS OF HIGHWAY CARGO FLOAT ON AIR

**with the new Clark Air Suspension System
for semi-trailers**

Damage to fragile goods—to perishable cargo—to empty running vehicles can be *minimized* by the new Clark Air Suspension unit.

This unique undercarriage, suitable for installation on new or in-use semis, allows both trailers and cargo literally to "float on air"!

Smooth, soft ride...

Doughnut-shaped "air-springs" carry full weight of trailer and cargo, absorb road shock, "flatten" even rough highways to a surprising degree. Ride actually approaches passenger-car softness!

High stability...

Lateral roll and sway are minimized by ingenious system of pivoted torque arms and torsion bars which take full force of side loads and absorb torsion resulting from brake torque.

Automatic load leveling...

When loading or unloading trailer, air reservoirs automatically adjust to support trailer bed at normal running height.

Versatile package unit...

All Clark Air Suspension assemblies come as complete packages, ready for installa-

tion. Parts are interchangeable between single and tandem units. Either suspension assembly can be used on new trailers or those already in operation.

Lower maintenance costs...

Because compressed air does the flexing and rubber mountings are employed, no lubrication is needed. Tanker operators will find that tank splitting and cracking of returning "empties" is minimized. Operators of other types of trailers will also find their trailers lasting longer and requiring less maintenance.

Weight advantages...

Trailer manufacturers using the Clark Air Suspension System can lighten frame and body construction, increase longevity—without sacrificing load-carrying ability.

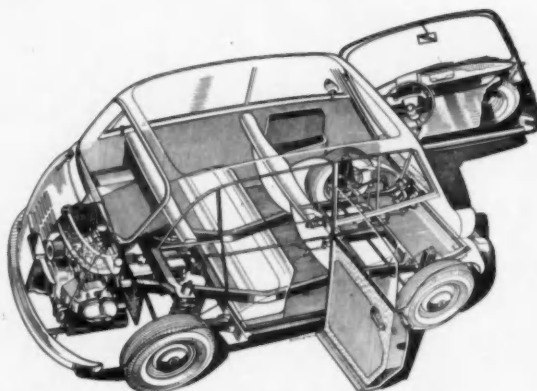
Why not investigate...

Whether you manufacture highway semi-trailers or operate them... whether you haul eggs or engines... whether one trailer or a hundred are involved... it will pay you to get the facts on Clark's new Air Suspended Trailer Axles. Ask us for detailed, illustrated Brochure No. AS-500

CLARK EQUIPMENT COMPANY
Buchanan 2, Michigan

**CLARK®
EQUIPMENT**

BMW 600 Has Unique Front and Side Doors



This illustration shows seating arrangements, steering gear hookup, door designs, etc., of the BMW 600.

THE BMW 600, developed by Bayerische Motorenwerke of München, Germany, is scheduled to go into production by the end of this year. It is based on the BMW Isetta Motocoupé two seater minicar, an Italian design by Iso, of Milan, of which BMW has produced nearly 70,000 under license.

The new vehicle is a BMW development and does not carry the name of Isetta. Incidentally, the latter will remain in production and is not replaced by the BMW 600. An outstanding feature of the BMW is the fact that with an overall length of only 114 in. and a wheelbase of 67 in. it is capable of carrying four persons comfortably.

The rear suspension with trailing links and coil springs and the divided two-joint axle shafts are new. The power unit is derived from the 35.7 cu in. motorcycle flat-twin BMW. Power output is 19.2 net bhp at 4000 rpm, and maximum torque of 29 lb ft net is delivered at 2500 rpm. For the BMW 600, a new air cooling sys-



The BMW 600 which carries four passengers although its overall length is only 114 in.

tem with a ducted fan has been designed and the air stream blown over the opposed cylinders by a

centrifugal fan is used for creating an induction hot spot and for heating the interior of the car.



What Price Executives?

(Continued from page 100)

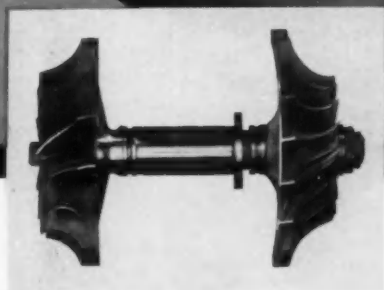
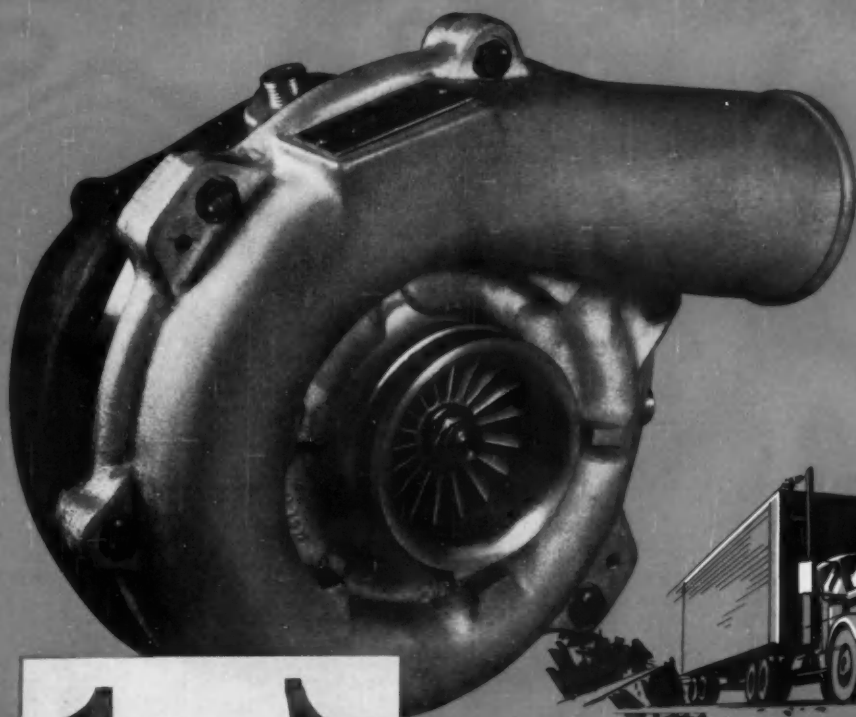
4. Second-line executives seemed to receive greater penalties in compensation than their bosses, the chief executives.

This special analysis presents automotive executive compensation trends against the backdrop of factors

that may condition results. The findings are based upon reports submitted to the SEC by 36 parts manufacturers. This, in turn, is part of a survey of 18 industries and 606 companies reported on by McKinsey & Co., Inc., annually in the *Harvard Business Review*.

Score Card—1956

Top executives in industry in general fared well in
(Turn to page 175, please)



NEW! Simpler Design **Makes Thompson Turbochargers Easier to Service**

Careful location of simple, one-piece bearing in Thompson Turbochargers has resulted in high critical speeds at smaller shaft diameters. This means lower bearing surface speeds at equal compression ratios . . . greatly increased bearing life.

In addition, every precaution has been taken to prevent turbine heat from reaching the bearing area. Turbine shields, swept by compressor discharge air, effectively reduce heat transfer to the bearing housing.

Throughout new Thompson Turbochargers you'll find many other important design features. Advanced design impeller gives you highest efficiency over a wider range of operation . . . simple, lightweight impeller and turbine respond instantly to speed and load changes.

With all of these advantages, new Thompson Turbochargers can be custom-matched to your diesel engine models up to 300 horsepower. Our engineers are available to work with you.



Write on your company letterhead for Booklet AI-457 containing detailed engineering data on Thompson Turbochargers.



JET DIVISION
Thompson Products, Inc.

Cleveland 17, Ohio

• • INDUSTRY STATISTICS • •

1957 WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending		Year to Date	
	Sept. 28	Sept. 21	1957	1956
PASSENGER CAR PRODUCTION				
Hudson			1,345	5,469
Nash			3,561	12,373
Rambler	2,076	1,921	65,147	58,323
Rambler Ambassador	678	485	1,900	
Total—American Motors	2,754	2,406	71,953	76,166
Chrysler	864	193	94,221	79,507
De Soto	1,570	963	91,636	71,221
Dodge	4,293	1,967	226,439	139,060
Imperial	227	85	30,495	
Plymouth	6,111	444	518,714	315,195
Total—Chrysler Corp.	13,065	3,662	961,505	604,982
Edsel	4,280	5,173	42,165	
Ford	27,975	30,573	1,184,562	924,380
Lincoln and Continental	594	516	29,088	36,706
Mercury	870	4,063	226,498	187,004
Total—Ford Motor Company	33,719	40,625	1,462,323	1,148,090
Buick	0	0	256,474	427,313
Cadillac	0	2,922	120,913	114,993
Chevrolet	1	829	1,124,515	1,192,929
Oldsmobile	0	6	296,868	344,046
Pontiac	0	0	262,692	258,372
Total—General Motors Corp.	1	3,757	2,103,462	2,337,653
Packard	0	0	6,118	13,289
Studebaker	2,072	1,791	47,757	54,793
Total—Studebaker-Packard Corp.	2,072	1,791	53,875	68,082
Checker Cab	89	61	3,011	2,837
Total—Passenger Cars	51,610	52,302	4,676,129	4,237,820
TRUCK AND BUS PRODUCTION				
Chevrolet	0	255	256,487	264,235
G. M. C.	982	1,008	50,505	69,547
Diamond T	145	127	4,167	3,919
Dover	60	60	2,331	2,857
Dodge and Fargo	766	958	58,636	66,032
Ford	3,950	6,112	263,015	230,642
F. W. D.	41	18	92	1,277
International	2,508	2,554	97,115	103,472
Mack	391	304	13,166	13,976
Reo	95	118	3,561	2,942
Studebaker	156	160	7,637	11,402
White	61	279	10,992	13,437
Whitely	656	1,840	48,442	48,412
Other Trucks	65	65	3,220	5,217
Total—Trucks	9,996	13,458	813,148	834,369
Buses	60	50	3,144	3,379
Total—Motor Vehicles	61,566	65,810	5,492,421	5,075,569

1957 TRUCK TRAILER SHIPMENTS

Type of Trailer	Seven Months		
	July	1957	1956
Vans			
Insulated and refrigerated	264	2,009	3,479
Steel	59	412	795
Aluminum	205	2,397	2,724
Semi-insulated	30	373	
Steel	30	373	
Aluminum			
Furniture	80	1,072	1,361
Steel	75	979	1,361
Aluminum	5	93	
All other closed-top	1,487	11,688	16,266
Steel	842	5,582	8,908
Aluminum	845	6,106	9,358
Open-top	239	1,871	2,193
Steel	70	929	914
Aluminum	199	942	1,279
Total—Vans	2,100	17,613	23,299
Tanks			
Petroleum	329	2,824	3,096
All other	108	915	616
Total—Tanks	437	3,739	3,712
Pole, pipe and logging			
Single axle	26	249	399
Tandem axle	46	417	965
Total	72	666	1,364
Platforms			
Racks, livestock and stake	224	1,334	498
Grain bodies	67	879	906
Flat, all types	519	4,359	5,489
Total—Platform	810	6,572	6,893
Low-bed heavy haulers			
	213	1,954	1,999
Dump trailers			
	145	1,323	1,296
All other trailers			
	374	2,167	1,760
Total—Complete Trailers	4,151	34,234	40,345
Chassis	142	1,964	2,233
Total—Trailers and Chassis	4,293	36,198	42,578

Revised. Source: Industry Div., Bureau of the Census.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	Seven Months			Per Cent Change		
		July 1957	June 1957	July 1956	July over June	July over July 1956	Seven Months 1957 over 1956
1	New England	30,547	29,786	31,504	+ 2.55	- 3.26	- 7.74
2	Middle Atlantic	110,442	108,239	101,461	+ 2.04	+ 8.85	+ 1.01
3	South Atlantic	85,691	83,313	87,200	+ 3.76	- 24.67	- 2.83
4	East North Central	127,189	124,997	123,679	+ 1.73	+ 2.68	+ .42
5	East South Central	26,072	22,557	23,732	+15.58	+ 9.88	- 3.53
6	West North Central	45,340	42,356	43,863	+ 7.05	+ 3.37	+ .60
7	West South Central	52,318	48,651	46,775	+ 7.54	+11.85	+ 3.04
8	Mountain	18,231	19,890	17,382	- 8.20	+ 4.82	- .23
9	Pacific	67,464	57,284	59,362	+17.77	+13.65	+ 1.06
Total—United States		543,264	517,043	534,997	+ 5.07	+ 1.55	- .26

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan.,

Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

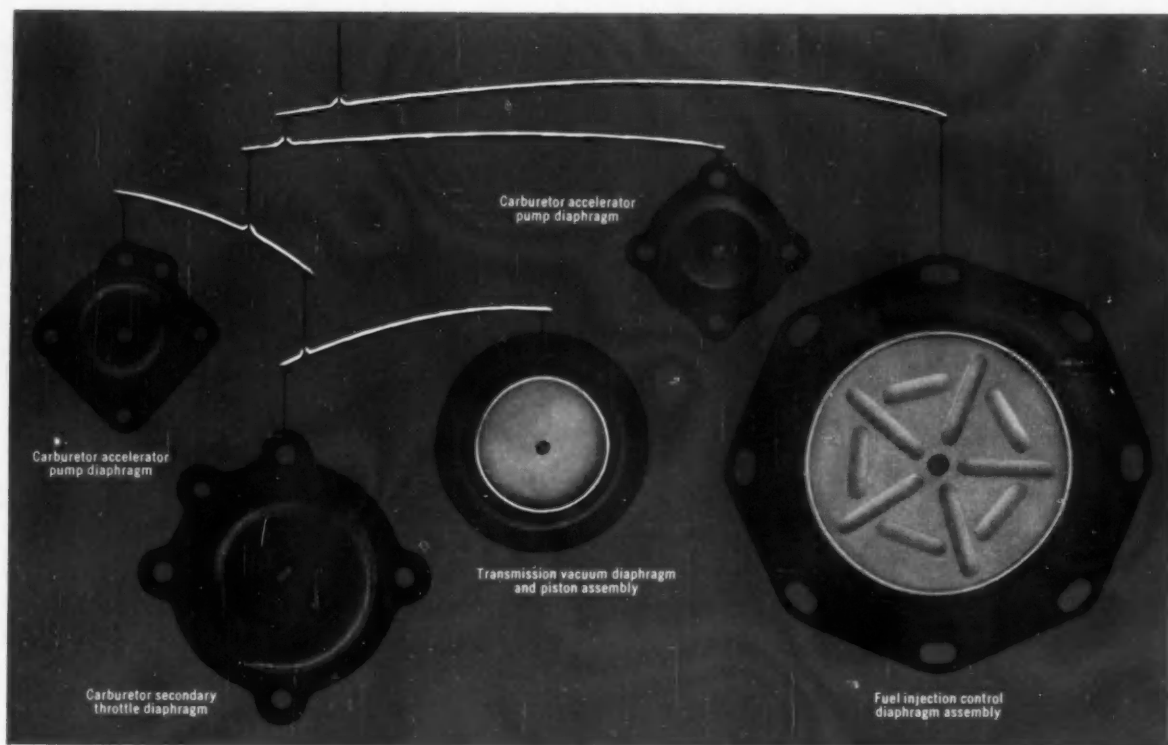
1957 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less			10,001-14,000 lb.			14,001-19,500 lb.			19,501-26,000 lb.			26,001-33,000 lb.			Over 33,000 lb.			Total
	First Quarter	Second Quarter	Total—Six Months	First Quarter	Second Quarter	Total—Six Months	First Quarter	Second Quarter	Total—Six Months	First Quarter	Second Quarter	Total—Six Months	First Quarter	Second Quarter	Total—Six Months	First Quarter	Second Quarter	Total—Six Months	
July	139,575	137,091	276,666	38,996	38,996	77,992	11,533	11,533	23,066	20,251	20,251	40,502	10,286	10,286	20,572	9,065	9,065	18,130	576,395
August	43,368	43,368	86,736	13,099	13,099	26,198	7,655	7,655	15,310	3,275	3,275	6,550	2,541	2,541	5,082	2,297	2,297	4,594	89,150
Total—Eight Months, 1957	385,143*	385,143*	770,286	110,737	110,737	221,474	27,282	27,282	54,564	23,526	23,526	46,852	12,827	12,827	25,652	11,362	11,362	22,724	765,545
Total—Eight Months, 1956	301,444	301,444	602,888	138,607	138,607	277,214	28,819	28,819	57,638	14,073	14,073	28,146	58,991	58,991	117,982	24,453	24,453	48,906	763,275

* Prior to January 1, 1957, vehicles below 10,001 lbs. G.V.W. were grouped "5,000 & less" and "5,001-10,000 lb."

** Included with 26,001-33,000 lb. group.



Need Critical Diaphragms?

**C/R will design, compound and mold them
to your exact specifications**

Simple or complex, your diaphragm problem can be solved quickly, dependably with the help of C/R Sirvene engineers. Their specialized experience gained in the solution of hundreds of similar problems is yours to use. They will design and compound the correct elastomers to produce the exact degree of hardness, tensile strength, compression set, volume change and flexibility you require. Temperature resistance, with various materials, ranges from -100° to 500°F. , and compatibility with an equally

broad range of fluids, gases and solids, including petroleum base fuels and synthetic hydraulic oils can easily be achieved.

Whether you specify critical tolerances, exact concentricity or flawless bonding—the more reason to assign full responsibility to C/R Sirvene engineers. They'll assure the absolute uniformity and quality of your diaphragm straight through production. Define your diaphragm problem to us and see how we can help.



Write for your copy of the illustrated Diaphragm Bulletin SD-100.

CHICAGO RAWHIDE MANUFACTURING COMPANY

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Offices in 85 principal cities. See your telephone book.

In Canada: Manufactured and Distributed by Chicago Rawhide Mfg. Co. of Canada, Ltd. Hamilton, Ontario. Export Sales: Geon International Corp., Great Neck, New York.

Other C/R Products: C/R Shaft and End Face Seals • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic Gears

SIRVENE



DIVISION

**CHICAGO
RAWHIDE**

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, etc. This list is for the period August 29 to September 26, inclusive.

AEROQUIP CORP., Marman Div., Los Angeles, Calif.
Clamp—2200—\$97,900

AMERICAN LA FRANCE CORP., Elmira, N. Y.
Spare parts—\$35,585

AVCO MFG. CORP., Lycoming Div., Stratford, Conn.
Product improvement of T53-L-1 aircraft engine—\$267,739

AVCO MFG. CO., Lycoming Div., Williamsport, Pa.
Holding fixture, 270; stand, 134—\$44,411



WINNING HORSEPOWER for your motor-driven product

With a Lamb Electric *specially engineered* motor you obtain the motor qualities which are important in winning acceptance for your product.

Exceptional performance and dependability are standard with Lamb Electric Motors, at no increase in cost, because they are "custom tailored" by personnel having many years of experience in this field.

May we demonstrate these advantages for *your* new and redesigned products?

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A Division of American Machine and Metals, Inc.

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Truck, forklift, electric, 8000 lb cap—
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Four generators, Diesel electric, 1000 kw units complete—\$568,190

BARDEN CORP., Danbury, Conn.
Bearings—\$88,800

BEACH AIRCRAFT CORP., Wichita, Kans.

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BENDIX AVIATION CORP., Utica Div., Utica, N. Y.

Spare parts for J65 gas turbine engines—250—\$39,238

CHICAGO PNEUMATIC TOOL CO., Seattle, Wash.

Spare parts for Diesel engines—\$36,968
CO-OPERATIVE INDUSTRIES, INC., Chester, N. J.

Aircraft ignition equipment—\$37,205
CURTISS - WRIGHT CORP., Wright-Aeronautical Div., Wood-Ridge, N. J.

Bearings—\$20,934

DOUGLAS AIRCRAFT CO., INC., El Segundo, Calif.

Bomb racks—\$241,872
DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.

R6D spares—various—\$41,545

ELASTIC STOP NUT CORPORATION OF AMERICA, Union, N. J.

Nut—5,439,300—\$71,628

GARRETT CORP., AirResearch Manufacturing Co. of Ariz., Phoenix, Ariz.

Air turbine starters—\$121,591

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Automotive spare parts—6874—\$37,532

GENERAL MOTORS CORP., Detroit Diesel Engine Div., Detroit, Mich.

Engine, Diesel—12—\$37,951

GENERAL MOTORS CORP., Truck and Coach Div., East Pontiac, Mich.

Automotive spare parts—various—\$68,163 (Modification)

HAYES AIRCRAFT CORP., Birmingham, Ala.

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HOLLEY CARBURETOR CO., Van Dyke, Mich.

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HOOVER BALL AND BEARING CO., Ann Arbor, Mich.

Bearings—\$26,800

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MANSFIELD TIRE & RUBBER CO., Mansfield, Ohio

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MINNEAPOLIS - HONEYWELL REGULATOR CO., Minneapolis, Minn.

Aircraft accessory spare parts, 32 items—\$106,562

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Truck tires & tubes—400—\$18,344

UNITED AIRCRAFT CORP., Sikorsky Aircraft Div., Stratford, Conn.

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UTICA-BEND CORP., Utica, Mich.

Overhaul of J-47 aircraft engines—\$687,461

VERTOL AIRCRAFT CORP., Morton, Pa.

Ground handling equipment for aircraft—various—\$25,948

WEATHERHEAD CO., Cleveland, Ohio

Nut, hydraulic—472,000—\$84,676

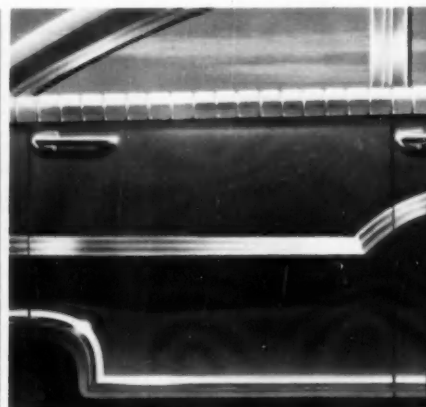
WILLYS MOTORS INC., Toledo, Ohio

Trucks—6—\$16,166

Trucks and spare parts—8—\$19,503

On CARS, too... "handsome is
as handsome does"...

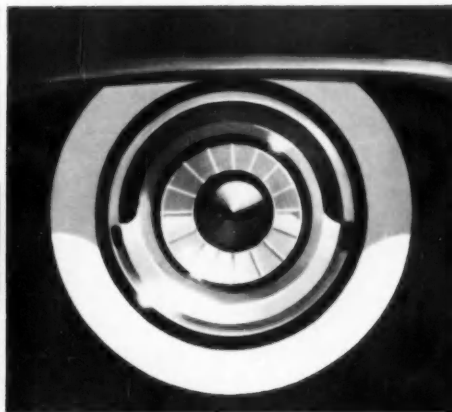
here's how
beautiful **Stainless Steel**
does a car-saving job for you



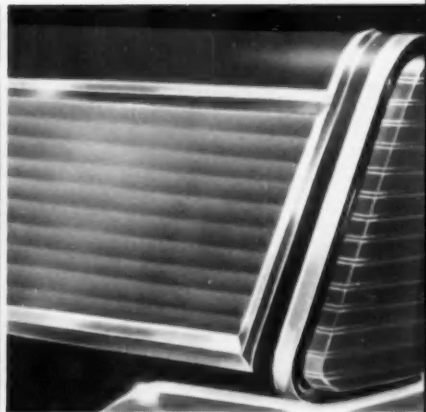
stainless moulding protects body paint from
rubs and scrapes



stainless trim makes weatherproofing
permanently attractive

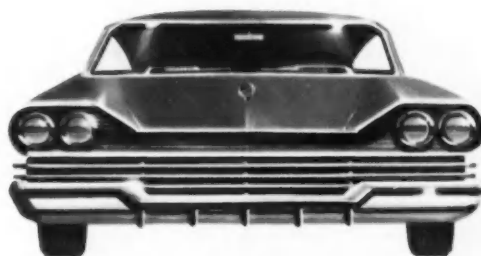


stainless wheel covers resist abrasion, stones and
road chemicals



stainless provides solid protection for easily-marred
decorative panels

and...
stainless brightens
the entire car
for life!



Superior Stainless Strip Steel

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

Tru-Stop Brakes

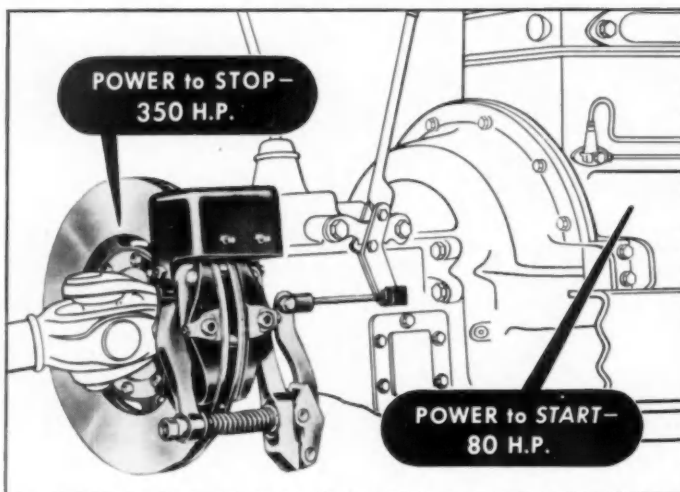
Meet Every Heavy-Duty Safety Requirement

**OFFER POSITIVE PROTECTION
AGAINST RUNAWAY OR PARKING
ACCIDENTS—AT LOWEST COST**

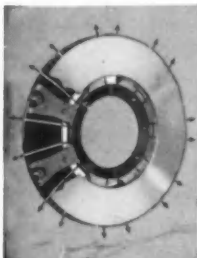
HERE IS WHY:

**They have surplus power
required for emergency
service—no dangerous
self-energizing**

TRU-STOP Heavy-Duty Emergency Brakes are not only excellent parking brakes. They serve as a complete, independent and fully reliable braking system. Operating on the propeller shaft they enable the driver to continue on safely in the event of service brake failure. TRU-STOP brakes have the surplus braking capacity to be used repeatedly as an auxiliary to service brakes.

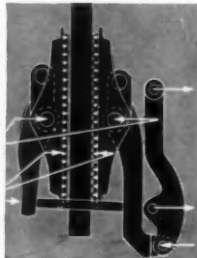


Brakes actually do more work than the engine in terms of horsepower. Where it takes 80 HP to accelerate to 20 miles per hour, it takes 350 HP to make a safe stop from 20 miles per hour within required limits.



Ventilated to throw off heat

Brake efficiency depends on ability to throw off intense heat—rapidly. Discs of TRU-STOP brakes are exposed to the air even during the braking operation. Ventilated design circulates air between the disc plates.



Give uniform brake pressure

Disc of TRU-STOP brakes is "squeezed" between the flat surface of the shoes. Effort applied to brake lever operates front and rear lever arms simultaneously. Pressure is exerted on the center of each shoe. Entire lining surface is in contact.

FOR SAFE, ECONOMICAL, HEAVY-DUTY BRAKING WITH MAXIMUM LIFE AND MINIMUM MAINTENANCE

TRU-STOP Brakes are used on a great variety of mobile and stationary equipment

SUCH AS—

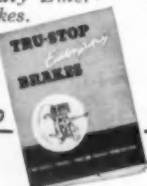
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Road rollers
Dump trucks
Power dividers
Cooling tower fans
Oil well pumps
Cold header presses
Scrubbing machines
Wire rope stranders
Fork lift trucks
Motor scrapers

Tractors
Graders
Diamond core drills
Electric locomotives
Oil well servicing rigs
Railway inspection cars
Shapers
Power take-offs
Winches
Motor shovels

Tractor loaders
Conveyors
Hard rock drill positioners
Mine locomotives
Power presses
Railway power ballisters
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*We will be glad to
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about TRU-STOP
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gency Brakes.
Send for*

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DH-33
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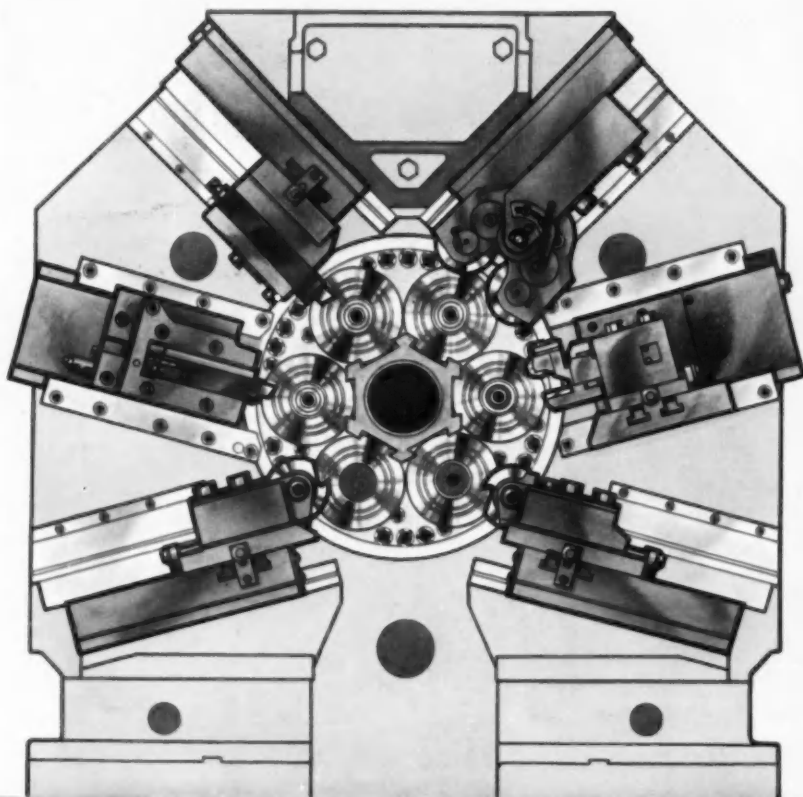
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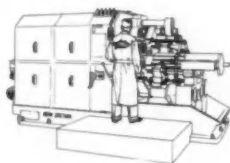
Look at New Britain's
**new cross slide
arrangement**



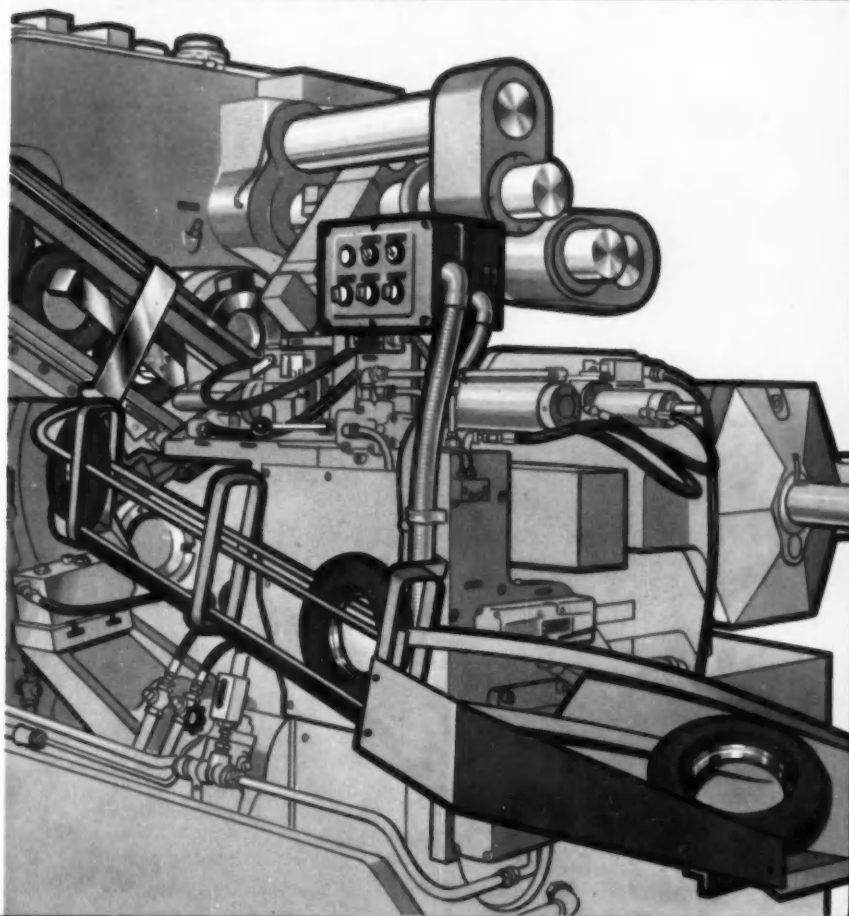
Independent radial cross slides in *all* positions, providing maximum clearance for more cross slide operations.

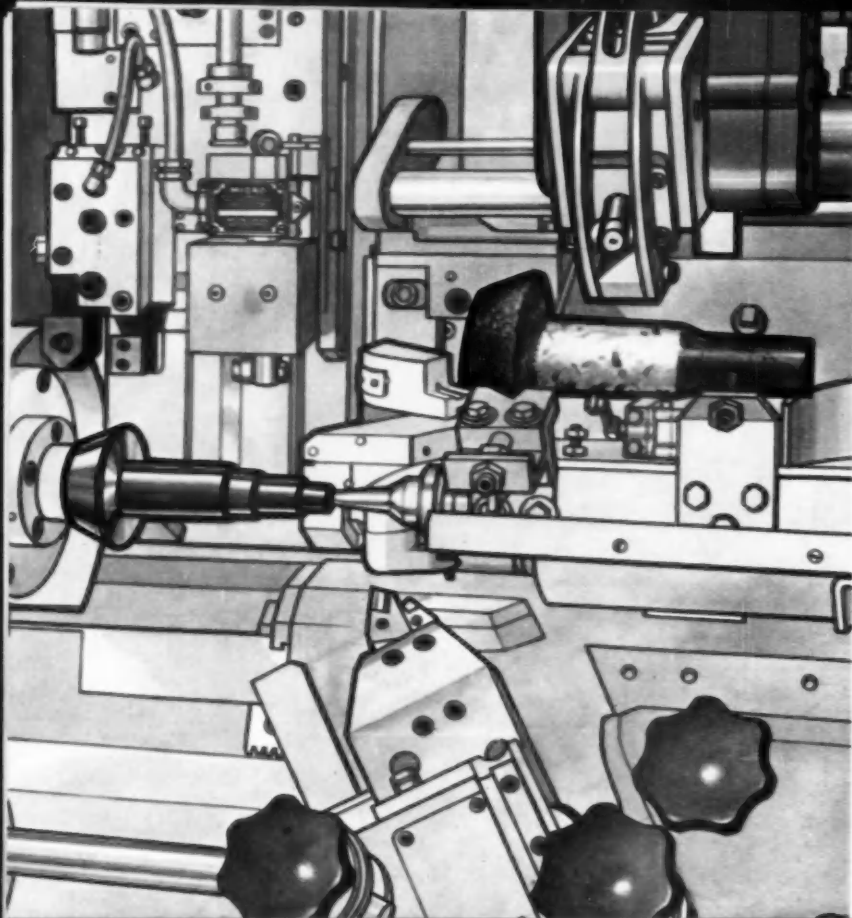


Look at New Britain's
**open-end
chucker design**



Greater accessibility for all applications and particularly well adapted to automatic handling of pieces. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

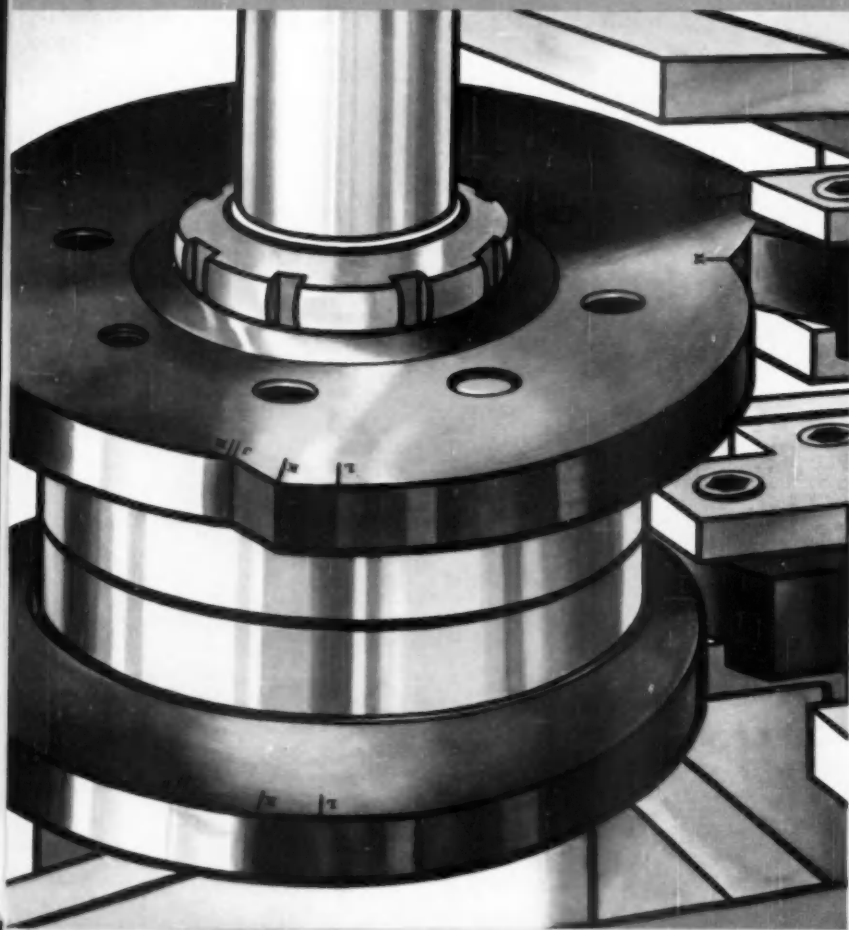




*Look at
Automatic Loading on*
New Britain +GF+



This basic optional feature can make money for you whether you are working with forgings, bar slugs, or bar stock.



Look at New Britain's
**cam-controlled
boring machine**



When you are working to tenths there is no substitute for the positive tool control that only precision cams provide. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.



THIS INSTRON TESTER measures the energy a tire carcass can absorb before failing. The tests on nylon cord tires proved that nylon's toughness can absorb approximately 2.5 times more energy than ordinary tire cord.

ON THE ROAD, in millions of miles of continuous service on taxi fleets, nylon cord tires have proved their shock-absorbing toughness and superior dependability . . . their capacity to withstand constant flexing and heat buildup.

TEST AFTER TEST PROVES NYLON TIRE CORD GIVES EXTRA TIRE STRENGTH FOR EXTRA SAFETY



Advertising in top magazines will run throughout the year to tell your customers of nylon's lasting ability to shrug off the abuse of "just-around-town" driving and thus offer utmost safety on the highway.

Modern engineering has given us the heaviest, most powerful cars ever to run on superhighways. Motorists need the lasting strength of nylon cord tires—tires able to withstand added strains of today's mile-after-mile sustained-speed driving. Stresses of power steering, power braking and higher horsepowers call for nylon's shock-absorbing toughness. Also, nylon cord tires can reduce unsprung weight.

Nylon cord protects against the four major causes of blowout: heat, moisture, flex fatigue and bruise damage; resists unseen carcass injuries that can seriously weaken tires.

Surveys and rising sales both show that motorists know and want the extra strength and safety of nylon cord tires.

Du Pont produces the nylon fiber.
All tire manufacturers make nylon cord tires.



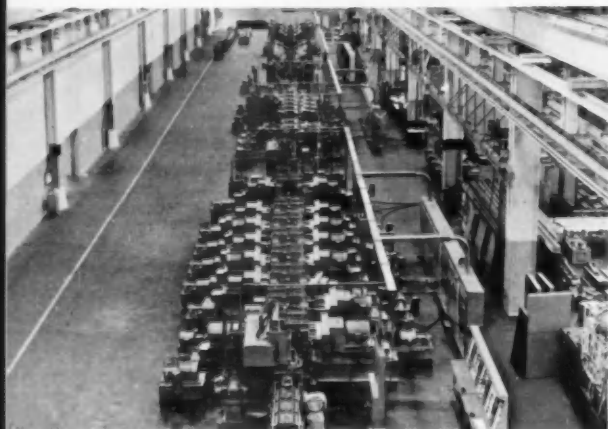
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Today, the strongest, safest tires are made with nylon cord

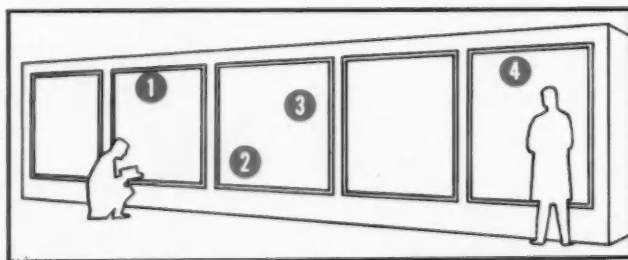
ANOTHER MANUFACTURER CHOOSES G-E CONTROL FOR AUTOMOTIVE INDUSTRY MACHINES



General Electric control helps turn



This Transfer-matic built by the Cross Company for a large automotive manufacturer can handle 130 cylinder blocks at a time.



1. Magnetic starters have bi-metallic overload relays for more dependable overload protection



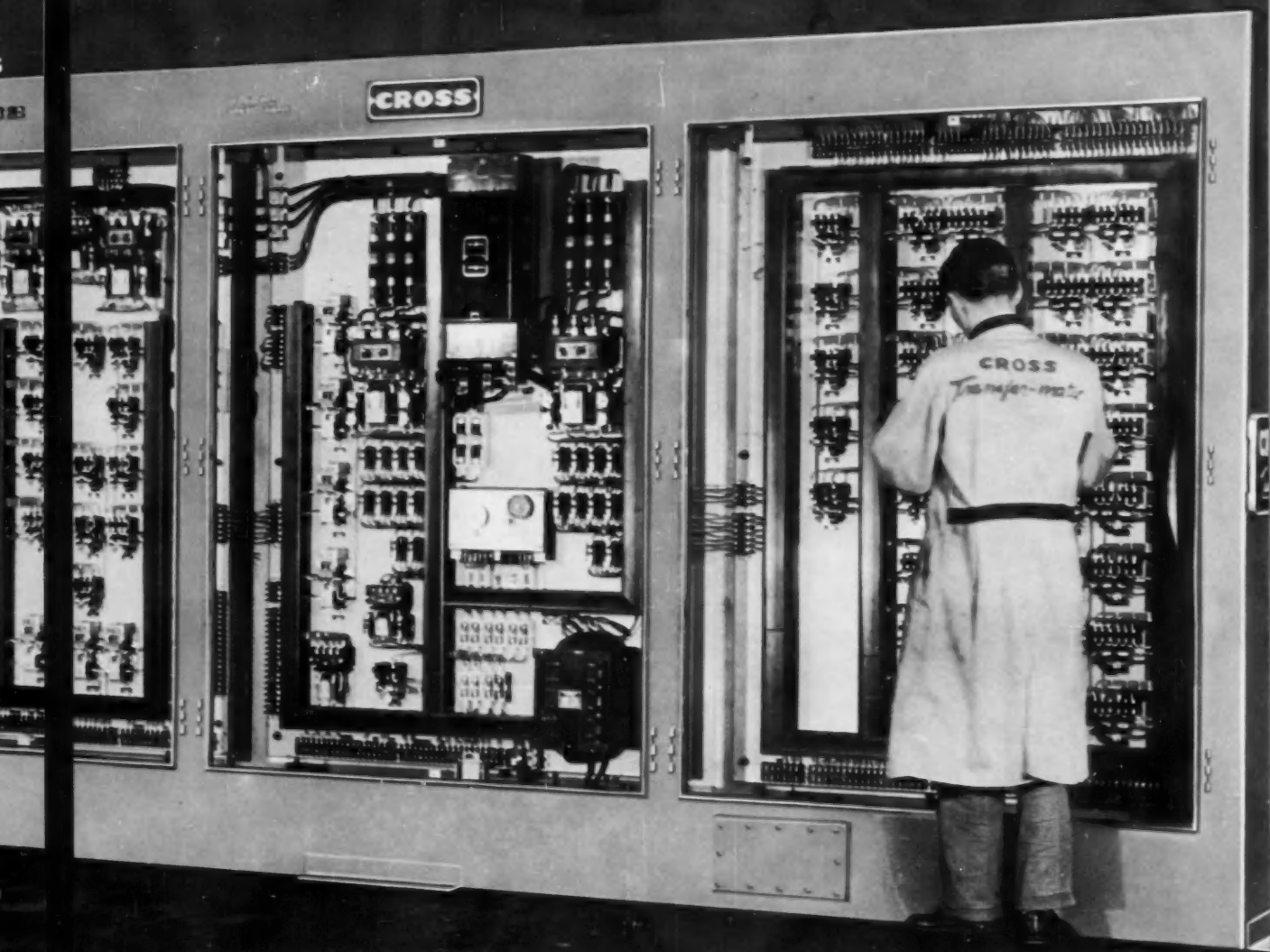
2. Latched-in relays can provide continuity of sequencing in case of voltage dip or power failure

3. Machine tool relays have strongbox coils and fine silver contacts for longer relay life



4. 6-pole-in-line machine tool relays can be mounted close together and removed from the front





out one engine block every 31 seconds

General Electric furnished control devices for three large automobile cylinder block finishing machines, built by the Cross Company, Detroit, Michigan, and installed in the plant of a large automotive manufacturer. Starters, relays, and contactors in 17 panels control more than 1,300 feet of transfer machines in three separate lines. Each line performs 829 separate drilling, tapping, milling, reaming, and chamfering operations. Each line is completely automated and can turn out two finished blocks per minute.

In building these highly complex machines, the Cross Company wanted the most accurate and dependable controls available. Explaining why General Electric

controls were specified, Kurt Tech, Cross Company's Vice President of Engineering said, "Our detailed and exacting specifications were met in every respect by General Electric controls."

General Electric can furnish you with a complete line of control which also includes oil-tight push buttons, strongbox solenoids and pneumatic time-delay relays for use on machines in your plant or on equipment bought from your suppliers. Your nearest General Electric Apparatus Sales Office or Distributor has full information. For your copy of GEA-6317, "G-E Control for JIC Standards", write to Advertising Section 733-37, General Electric Company, Bloomington, Ill.

GENERAL  **ELECTRIC**

Eastman

**First to be specified
by America's
leading OEM's**

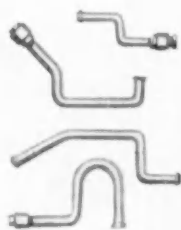
It's a known fact that many leading Original Equipment Manufacturers submit their original specifications for their first quotation to Eastman.

EASTMAN's unequalled experience in hydraulic conversion, plus many original designs shown in a few popular Eastman fittings at the right—give your product an appearance of quality that improves its competitive position in your field. It's a mark of distinction to be Eastman equipped!

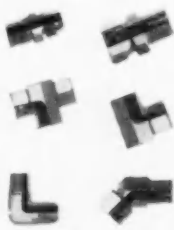
EASTMAN Engineering Service . . . Backed by Unequalled Experience

It is also a known fact that Eastman's co-operative engineering counsel and service is highly respected and often requested by leading OEM's. Let Eastman engineers help you lay out your fluid power lines—from pump to point of work—effecting economies in design, improving performance and increasing user satisfaction.

Let EASTMAN recommend the best assembly . . . for the best performance . . . at the lowest cost.



Bent Tubing with the necessary fittings to meet your own specific requirements.



Adapters, Adapter Unions and Boss "O" Ring Fittings. All types and sizes available.

A COMPLETE LINE OF HYDRAULIC FITTINGS and HOSE ASSEMBLIES...



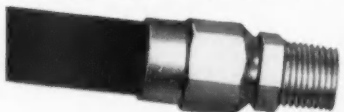
Permanently Attached Male (NPTF) for 1, 2 and 3 wire braid rubber cover hose, and 4 spiral wire extra high pressure hose.
Sizes: $\frac{3}{16}$ " thru 3".
Wkg. pressure: 375—5000 p.s.i.



Permanently Attached Male Flare (JIC) for 1, 2 and 3 wire braid rubber cover hose.
Sizes: $\frac{3}{16}$ " thru 2".
Wkg. pressure: 375—5000 p.s.i.



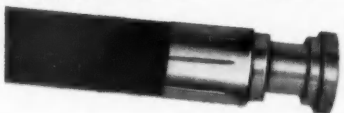
Permanently Attached Swivel Female for 1, 2 and 3 wire braid rubber cover hose.
Sizes: $\frac{3}{16}$ " thru 2".
Wkg. pressure: 375—5000 p.s.i.



Reusable Male (NPTF) for rubber and cotton cover hose.
Sizes: $\frac{3}{16}$ " thru $1\frac{1}{16}$ ".
Wkg. pressure: 375—5000 p.s.i.



Reusable Swivel Female for rubber and cotton cover hose.
Sizes: $\frac{3}{16}$ " thru $1\frac{1}{16}$ ".
Wkg. pressure: 375—5000 p.s.i.



Permanently Attached Flanged Head Couplings for 1 and 2 wire braid rubber cover hose.
Sizes: $\frac{1}{4}$ " thru 2".
Wkg. pressure: 375—5000 p.s.i.



Clamp Type Coupling with split flange stems for 1 and 2 wire braid rubber cover hose.
Sizes: $\frac{1}{4}$ " thru 2".
Wkg. pressure: 375—5000 p.s.i.



Power Steering Assemblies to meet all your requirements.



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ENGINEERS:

Write for Technical Bulletin 200 for Complete Information and Data on Fluid Power Lines.





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The superiority of the vast number of products that are—and can be made from Roebling Cold Rolled Flat Spring Steel is a fact known throughout all industry.

You pay for mechanical and dimensional uniformity when you buy flat spring steel...you get it when you buy Roebling.

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**MANY DOUGLAS ASSIGNMENTS LET YOU
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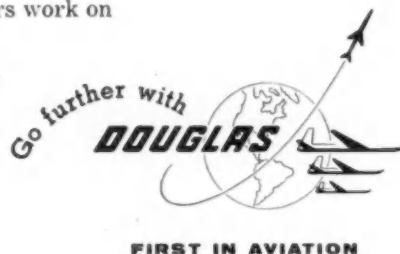
Frequently, it's important that you have the chance to apply theories you've helped to develop. Douglas is anxious that engineers expand their knowledge of a problem in practical ways. This is accomplished by keeping your assignments varied... by often letting you follow the job through to completion. There are many exceptional opportunities to start your career at Douglas, including...

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64th Annual Convention of the Farm Equipment Institute

BUSINESS in the farm equipment industry for 1957 will be distinctly better than in the preceding year, according to R. S. Stevenson, president of Allis-Chalmers Mfg. Co., Milwaukee. Mr. Stevenson spoke at the 64th Annual Convention of the Farm Equipment Institute, held in Chicago Sept. 16-18. Several factors have contributed to help the farmers who are the purchasers of this equipment, one of the most important being the breaking of the drought that has affected much of the west and southwest for periods up to seven years.

Cost-Saving Equipment

The farmers, said Mr. Stevenson, are caught in the same cost-price squeeze as industry, and are using the same means to get out of it. "They are finding, more and more, that buying cost-saving modern power equipment is truly an investment, and that prices received for their products are not nearly as important as the difference between that price and their cost of production." Farm equipment manufacturers have done an outstanding job in designing and building equipment which has greater use value to the farmer, and in keeping prices down. This is a result of expert engineering, real manufacturing skill, and considerable dedication to customer requirements. "The tractor today is well-powered, tough, versatile, and comfortable. Implements are useful and easily interchanged. Harvesting equipment ranging from the highly specialized to the extremely flexible is available in every size to match every requirement."

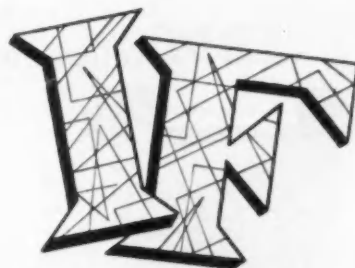
Farm machinery is not too high priced today, he said. "Taking 1947-49 as a base, the last Government Bureau of Labor Statistics index shows that wholesale prices of farm equipment have risen 32.2 per cent. During that same period of time, until the middle of this year, my own com-

pany's average hourly labor costs have increased by 82 per cent, and a weighted average of steel prices, the same types used in farm tractors, has gone up by 69 per cent.

Inflationary Factors

"There are several contributing factors to inflation," he continued. "But it appears to me that the present inflationary spiral results most directly from wage contracts initiated by collective bargaining between powerful international unions and the large employers in certain of our basic industries. These wage patterns are then coercively imposed on other employers throughout the country without regard to varying industry problems and conditions, or effect on the economy as a whole. This has resulted in a new kind of inflation—it starts with wage inflation, which turns into cost inflation and ends in price inflation. The resulting price inflation in turn raises the Bureau of Labor Statistics' cost of living index, and automatically—through operation of contract escalator clauses—triggers another round of wage increases which continue through the cycle and becomes a self-feeding spiral."

Recent general wage increases based on theoretical productivity improvement were not justified by actual improvement in our production efficiency, said Mr. Stevenson. "We are informed through public announcements by union leaders representing production people in our industry that in 1958 much more money will be demanded for much less productive time. This ignores the economic facts of life. We can take heart in the fact that intensive studies are being made by legislative committees and research groups on the effect on our economy of the growing union power—and the abuse of that power. In the long run, the people of this country have never tolerated the grasping of dictatorial power over



*Frequent down-time,
Materials loss, and
Rejects*

HAUNT YOU

*you'll probably find
the answer to your
fastener problems in*

SOUTHERN SCREWS

Southern maintains a stock of more than a Billion screws—all made to exacting standards in our own plant. If your products deserve the permanent assembly that only Quality fasteners can provide—specify Southern all along the line!



Write, on company letterhead, for Southern's Stock List, or for the Warehouse Guide from the Southern warehouse nearest you. Address Box 1360-A1, Statesville, N. C.

Wood Screws • Steel Bolts • Machine
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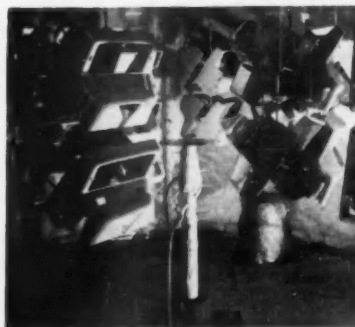
Warehouses:

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IBM relies on **RANSBURG
NO. 2
PROCESS
Electrostatic
Spray Painting**
to get the excellent
and uniform high quality wrinkle finish on all
IBM ELECTRIC TYPEWRITERS

Both prime and finish coats are uniformly applied to IBM Electric Typewriter cases as they rotate around the floor-mounted Ransburg No. 2 Process reciprocating disks. Automatic Electro-Spray provides three times as many pieces per gallon as by former hand spray.



IBM's strict quality standards are easily maintained with Ransburg No. 2 Process in the painting of Electric Typewriter parts. Rejects by the former hand spray method used to run as high as 30% on some parts. Now, with automatic Electro-Spray, rejects for all reasons are only 3% to 5%.

Three Times as Many Pieces per Gallon!

Along with increased production, paint mileage is stepped up, and they get three times as many pieces per gallon as by the former hand spray method. That's because efficiency of the Ransburg No. 2 Process Reciprocating Disk puts the paint where it's supposed to go . . . on the parts.

Want to know how Ransburg Electro-Spray can improve the quality of your painted products . . . and at the same time, cut your paint and labor costs? At no obligation to you, we will make complete laboratory tests with your products to prove the advantages and cost saving benefits which can be yours with Ransburg No. 2 Process. Write or call.

Ransburg **ELECTRO-COATING CORP.**
Indianapolis 7, Indiana



our economy by any single economic group."

Gross Farm Income

The outlook for agriculture and for agricultural implement sales was discussed by J. Carroll Bottom, Purdue University. Farm income for the next 12 months is expected to continue near the levels of the first half of this year, with demand for farm products about the same as in 1956. Prices paid by farmers for production items will rise 2 to 3 per cent. Gross farm income for the first half of the year was 3 per cent higher than for the same period last year, with cash receipts from meat animals up 12 per cent, dairy products up 5 per cent, poultry and egg receipts down 14 per cent. Total crop sales were down 3 per cent, with most of the decline coming in cotton, fruits, and vegetables.

Decreasing Number of Farms

By 1975, a continued decrease in the number of farms is indicated. The maximum number of farms was reached in 1920, when there were 6,448,000. The 1954 census showed only 4,782,000, but the average farm had increased in size from 148 acres to 242 acres. Of the 4,782,000 farms, 44 per cent produce over 90 per cent of the agricultural products marketed. Increasing size and specialization are indicated.

With wages of agricultural workers rising in August, 1957, to 4.46 times the 1940 wage, farm machinery, which has risen to only 2.23 times the 1940 level, becomes relatively cheaper. That means that a fewer number of days of hired labor is required to buy a farm tractor. In 1940 the price of a 20-30 hp tractor was equivalent to 660 days of hired labor, compared with only 348 days in September, 1956.

Reducing Trade-Ins

Lyman J. Goes, president of the National Retail Farm Equipment Association, said that a more detailed system of records would help dealers to keep closer control of their business. In the field, a systematic junking program could



U.S. Patent
No. 2,789,872

What automotive engineers now know about Sealed Power's New Stainless Steel Oil Ring

It does things no other ring can do!

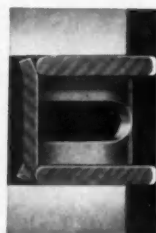
CHECK THESE DESIRABLE FEATURES—
carbon steel rings don't have them

- holds full room temperature tension at engine operating temperature
- resists corrosion, will not pit
- sludge doesn't form on stainless steel finish
- actually hardens in use

DETAILS OF NEW OIL RING EXPANDER-SPACER



Circumferential abutment type design makes the ring independent of depth of piston groove. It exerts pressure uniformly . . . conforms more readily to the bore.



Proper axial pressure of the rails against sides of groove assures side-sealing. This provides smoke control under high vacuum conditions.

TWO ADDITIONAL IMPORTANT ADVANTAGES—

Chrome-faced side rails for extra long life in high compression engines—**LAPPED FOR QUICK SEATING**

Easy assembly—requires about 20 seconds per piston

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Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911

Largest Producers of Sealing Rings for Automatic Transmissions and Power Steering Units

go a long way toward eliminating the trade-in problems of the dealer, and stimulate sales.

Officers Elected

R. S. Stevenson was elected president of the FEI. Vice-presidents elected were H. T. Armstrong, Harriman Mfg. Co.; G. T. Cockshutt, Cockshutt Farm Equipment Co. Ltd.; Henry Danuser, Danuser Machine Co.; George C. Delp, New Holland Machine Co.; Clyde B. Dempster, Dempster Mill

Mfg. Co.; E. H. Fisher, The Oliver Corp.; A. C. Gehl, Gehl Bros. Mfg. Co.; W. A. Hewitt, Deere & Co.; R. C. Hudson, H. D. Hudson Mfg. Co.; Mark V. Keeler, International Harvester Co.; Norman L. Krause, Krause Corp.; C. R. McMicken, B. Hayman Co., Inc.; F. E. Myers, II, F. E. Myers & Bro. Co.; Wade Newbegin, R. M. Wade & Co.; John T. Phillips, Sr., Libliston Implt. Co.; George Reuland, Allis-Chalmers Mfg. Co.; C. W. Stoup, Avco Mfg. Corp.; James H. Will-

son, Athens Plow Co., Inc.; W. A. McGill, DeLaval Separator Co.; Martin R. Sehm, Herschel Mfg. Co.

AIRBRIEFS

(Continued from page 96)

semblies. Advantages claimed are: Reduction in weight; increased fatigue life; smoother external finish; increased strength, and simplification of design.

Aircraft Nuclear Propulsion Progress

Successful operation of a turbo-jet unit for aircraft powered by heat from a nuclear reactor has been accomplished by General Electric Co.'s Aircraft Nuclear Propulsion Department at Idaho Falls, Idaho. The operation was conducted at the company's ground test facilities in Idaho. They have also tested electronic components for control of an atomic reactor which have operated successfully at 845 F and in high intensity radiation for a period of more than 1000 hours.

Among other atomic energy activities at G. E. Co.'s Atomic Products Division, which employs some 14,000 persons, are: Atomic Power Equipment Department at San Jose, Calif.; Hanford Atomic Products Operation at Hanford, Wash., and the Knolls Atomic Power Laboratory at Schenectady, N. Y.

Helicopter Use Becoming Big Business

A handful of commercial operators began using the helicopter in agriculture flying in 1947. From this modest beginning a worldwide industry has emerged. In North America, more than 380 helicopters are presently being operated by 89 commercial helicopter operators, according to report by the Helicopter Council of the Aircraft Industries Association. Leader among the operators is Okanagan Helicopters, Ltd., located at Vancouver Airport, Vancouver, B. C., Canada. This company operates with 43 helicopters, including 25 Bell 47's, 17 Sikorsky S-55's and one Sikorsky S-58.

(Turn to page 122, please)

ROCKFORD MORLIFE® Over-Center CLUTCHES

Provide



400% LONGER WORK LIFE

Reports from a wide range of users state that MORLIFE clutches serve from four to ten times longer than previous types of friction clutches using organic facing materials. Adjustments and plate replacements have been reduced to one-tenth those required by previous clutches. The longer on-the-job hours and increased pay loads which MORLIFE clutches make possible furnish a competitive advantage for machines in which these NEW clutches are used. Increased clutch life results in decreased operation cost of vehicles or equipment. Let our engineers show you how your product will benefit through using MORLIFE clutches.

SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER

315 Catherine St., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

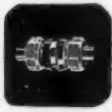
CLUTCHES



Small Spring Loaded



Heavy Duty Spring Loaded



Oil or Dry Multiple Disc



Heavy Duty Over Center



Power Take-Offs



Speed Reducers



Briquetting—Powder Metal Forming? **investigate CLEARING HYDRAULICS**

Clearing engineers are at your disposal for help in selecting the proper press for your particular needs.

Deep, difficult draws, straightening, forming and hobbing — these are more conventional operations where Clearing Hydraulic presses also excel. We have some remarkable case histories on some of these presses — in fact, a wealth of information on Clearing hydraulics. Why not send for it right away?

Working With These Metals?

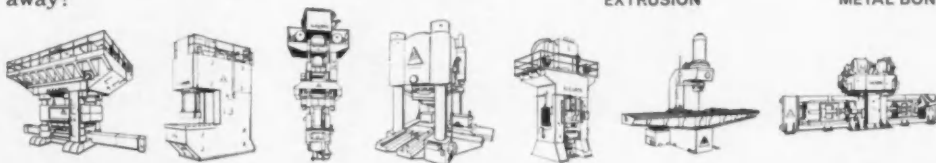
TITANIUM
TANTULUM
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ZIRCONIUM

There is a CLEARING HYDRAULIC PRESS especially suited for each of the following specialized operations:

POWDERED METAL
FORMING
BRIQUETTING
EXTRUSION

FORGING
DIE QUENCHING
RUBBER PAD FORMING
METAL BONDING



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THE WAY TO EFFICIENT MASS PRODUCTION

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It contains dollars-and-cents proof that glove costs can be reduced. Write today to Jomac Inc., Dept. H, Phila. 38, Pa. and ask for "Evidence" booklet.



JOMAC INDUSTRIAL GLOVES

Plants in Philadelphia, Pa., and Warsaw, Ind.
In Canada: Safety Supply Company, Toronto

(Continued from page 120)

Next in number of helicopters being used is Rick Helicopters, Inc., with 30 rotary wing machines. Headquarters is at the San Francisco International Airport with affiliate companies, U. S. Helicopter Service, Inc., and Alaska Helicopters, Inc.

Petroleum Helicopter Service, Inc., of Lafayette, La., operate 29 machines, including 23 Bell 47's, five Sikorsky S-55's and one Sikorsky S-58.

All three of the original helicopter air-mail contractors now carry passengers on most of their regularly scheduled flights. Los Angeles Airways, Inc., the first certified helicopter operator, is now using one Sikorsky S-51 and five Sikorsky S-55's. Chicago Helicopter Airways, Inc., operates six Bell 47's, three Sikorsky S-55's, one Sikorsky S-58, and has on order two more S-58's. New York Airways, Inc., are currently using one Bell 47, five Sikorsky S-55's, and three Sikorsky S-58's.

Rocket Powered Target Drone

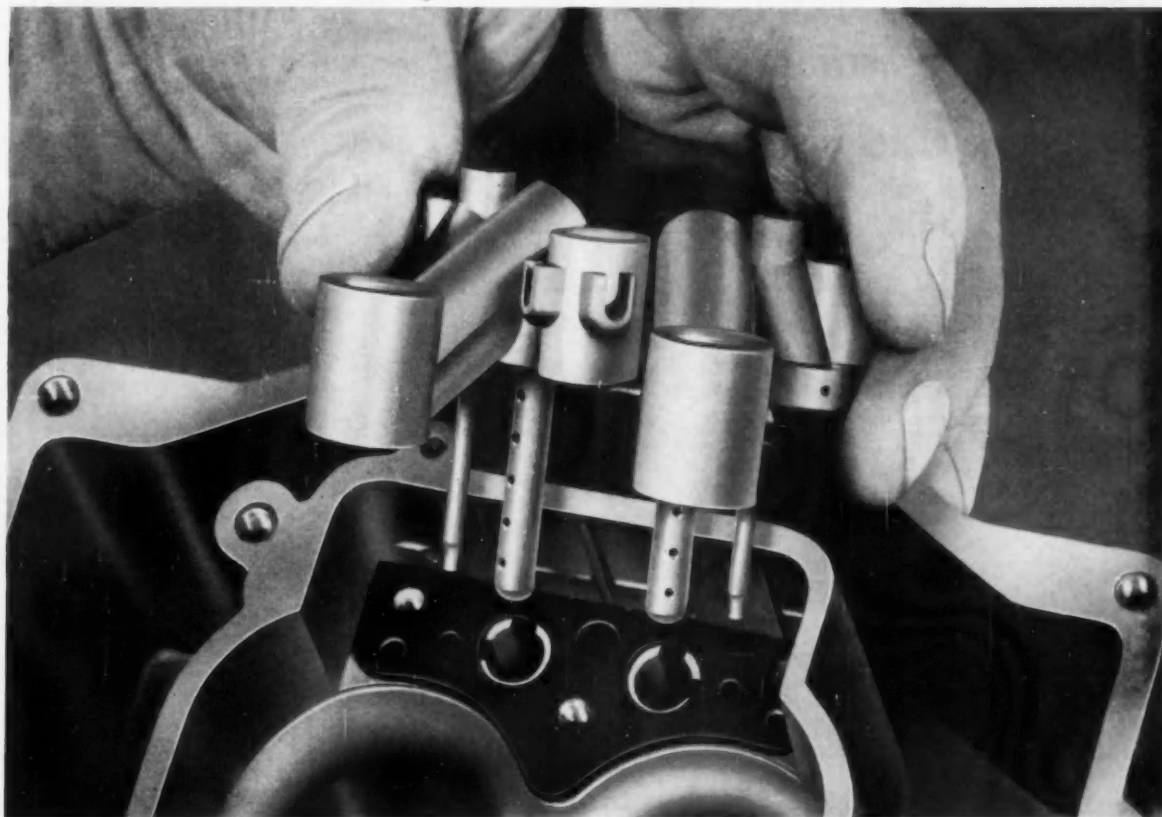
The nation's first successful rocket-powered target drone, the XKDT-1, has made its initial flight in September at the Naval Air Missile Test Center, Point Mugu, Calif. Designed to sharpen the aim of the Navy's fighter pilots, the XKDT-1 can operate near the speed of sound at altitudes of up to 50,000 ft. Manufactured by Temco Aircraft Corp. at Dallas, Texas, the XKDT-1 resembles a missile in shape. It is about 12 ft long, with a wing span of 58.8 in. and body diameter of 10 in.

In its first successful flight, the drone was carried aloft by an F3H-2M Demon Fighter. At 20,000 ft, the pilot pushed a button which launched the drone from beneath the wing of the aircraft. It then zoomed away on rocket power, holding a straight course for nearly eight minutes.

Avro Arrow Rolled-Out

The first supersonic aircraft to be created by the Canadian aviation industry, the CF-105, Avro Arrow, rolled-out from the production bays of Avro Aircraft Limited

These advantages keep **R**ochester America's leading carburetor . . .



**PRE-CALIBRATED CLUSTERS, FEWER MOVING PARTS
MEAN LONGER LIFE FOR ROCHESTER CARBURETORS!**

Rochester will "GO" a long way to keep your customers happy. Nothing's ever left to chance. For example, accuracy is built-in to assure the split-second timing and metering that's so vital to today's performance. Every venturi cluster, with pressed-in idle tubes and main discharge nozzle, is pre-calibrated at the factory . . . no field adjustments necessary. And fewer moving parts mean longer, trouble-free life . . . ease of service. So be sure your cars are equipped with Rochester Carburetors . . . it's the best way to drive home a powerful performance story to your customers. Rochester Products Division of General Motors, Rochester, N. Y.



ORIGINAL EQUIPMENT ON OVER 20,000,000 FINE CARS AND TRUCKS

ROCHESTER CARBURETORS

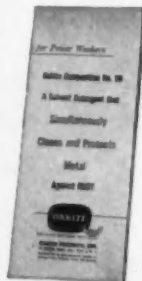
These Oakite shortcuts speed your metal cleaning

1. Cleaning and rustproofing —in one washing operation.

Oakite Composition No. 98 (used cold or hot in one-stage or two-stage washing machines) quickly removes cutting oils and chips and leaves a thin film that protects steel against rusting between operations or during temporary storage.

Excellent for cleaning before inspection: the metal is cool for immediate handling and the film (too thin to affect measurements) prevents finger prints from corroding highly finished surfaces.

One auto manufacturer uses No. 98 in seven plants for cleaning and rustproofing brake cylinders, camshafts, connecting rods, crankshafts, cylinder heads, flywheels, push rods, tappets, wrist pins, etc.



2. Stripping pigmented paints—with no need for pickling before repainting.

Oakite Rustripper saves money in paint shops by doing a complete stripping job in one operation. It eliminates extra pickling and neutralizing to remove the metallic pigments, phosphate coatings and rust that prevent successful repainting.

A television manufacturer says "We formerly took 25 minutes to strip rejected cabinets, then had to pickle to remove tarnished phosphate coatings. Today 10 minutes in Rustripper strips the same cabinet so bright and clean you can't tell it from new. Eliminates pickle, neutralize and rinses."

An auto parts maker uses Rustripper for continuous conveyor line stripping. "Cycle of 1 minute and 50 seconds works like a charm stripping paint and incidental rust from rejects and hooks."



FREE For full information write for booklets:

1. "For Power Washers—Oakite Composition No. 98" or
2. "Here's the best shortcut in the field of organic finishing."

Address Oakite Products, Inc., 24 Rector St., New York 6, N. Y.

Technical Service Representatives in Principal Cities of U.S. and Canada



Export Division
Cable Address: Oakite

at Malton, at 2:30 pm, October 4. This was the first public viewing of the high-speed, delta-winged interceptor. At the conclusion of the unveiling ceremony, the aircraft was removed to Avro's Flight Test hangar for its extensive pre-flight test program.

Development of the 1000 mph-plus missile-armed CF-105, Avro Arrow has been attracting the keen interest of international military aviation circles, where it is regarded by many as being one of the most advanced combat aircraft of its type in existence.

Employee Suggestion Award

A \$1771 employee suggestion award—largest ever made at Convair (San Diego), a division of General Dynamics Corp. — has been presented to Robert D. Molitor, setup man in Shipping and Stores at the Convair San Diego Materials Building, Rose Canyon.

Molitor received half of the cash award in the first payment and will be paid a like sum in six months if his suggestion is still in force, under terms of the Employee Suggestion Program. The suggestion dealt with elimination of waste in shearing high-cost titanium used in fabricating engine shrouds for the Convair F-102A Delta Dagger, all-weather, supersonic interceptor.

Over-Running Clutch Assembly Developed by Bendix Aviation

Eclipse Machine Div. of Bendix Aviation Corp. has announced a new centrifugally operated over-running clutch assembly designed for automotive use as well as other commercial and industrial applications.

Bendix claims the unit, which can be built for any torque capacity, is lower in cost and substantially smaller than similar units. It features a minimum amount of over-running friction.

Edsel Div. Joins Television As Sponsor of "Wagon Train"

Edsel Div. will become a regular television sponsor Oct. 23 when it takes over NBC-TV's "Wagon Train" on an alternate-week basis. Edsel made its television debut Oct. 13 on an hour-long special show with Bing Crosby and Frank Sinatra.

handle

One Unit

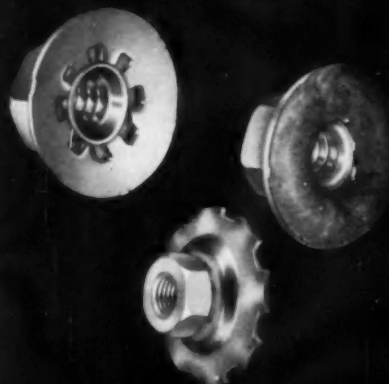
instead of

Two or More

cut costs instantly!



KEPS® pre-assembled nut and
Shakeproof® Lock Washer



Each of these Keps replaces three separate units for greater savings: Dished and Domed Washer Keps for extra strength and holespanning; Sealing Keps for sealing out water, oil, gasoline or air.

- Keps end separate nut and lock washer handling • Often eliminate many extra fastening parts • Provide positive locking action, maximum product protection • Washers can't get lost, mismatched or forgotten
- Available in broad range of styles, materials and sizes.

Write for Sample Kit Containing Variety of Keps

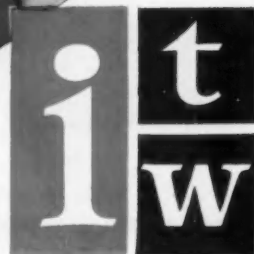
SHAKEPROOF

"FASTENING HEADQUARTERS"®

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Road Speed Governor

(Continued from page 57)

valve which is arranged to limit engine rpm in the higher range required for low gear operation.

If both low gear engine speed control and road speed control are desired, then the road speed governor valve and the engine governor valve may be arranged in series, as illustrated. In this case both governor valves communicate with the same control diaphragm

and throttle in the combination carburetor and governor body.

In general, the operation of the two types of valves is quite similar. The new road speed governor valve has a centrifugal type rotor mechanism designed to meter the flow of filtered air (from the air horn of the carburetor) to the low pressure side of the governor diaphragm in the carburetor throttle body. As illustrated, the governor control valve comprises the valve body, the rotor which is driven from the speedometer cable at the

lower end, and the centrifugal weight and valve spring.

At speeds below governed speed, the centrifugal weight is in a position part way out on the rotor cross shaft under restraint of the spring. As the governed speed is approached, centrifugal force overcomes the spring force and the weight moves outward. The weight partially covers the air bleed hole in the cross shaft, restricting the flow of air and causing a corresponding increase in vacuum in the chamber behind the governor throttle diaphragm. The pressure differential due to increased vacuum allows the diaphragm to overcome the force of the spring on the throttle valve and move the throttle to a restricted opening position.

In operation, therefore, the governor weight is always balanced between centrifugal force and the valve spring. Similarly, the governor throttle diaphragm is always balanced between the pressure differential on both sides and the tension of the throttle spring. Any slight change in vehicle speed upsets this balance, causing the centrifugal valve to react. This results in varying the amount of air, thereby varying the pressure balance on the diaphragm.

Figure 1 is a cross-section of the new road speed governor which is driven by the speedometer cable. The assembly of this unit, Fig. 2, shows the simplicity of the housing as well as the flexibility of attachments for mounting in any convenient location.

Figure 3 shows diagrammatically the suggested arrangement for combining both road speed and engine governor valves to actuate a common governor throttle control in a Holley carburetor.

From the foregoing it is clear that Holley offers a choice of either the road speed governor or an engine speed governor; or a simple combination of both, in an arrangement that permits actuation of the same throttle control. The combination, when selected, gives the truck operator complete control of maximum engine speed for all operating conditions. It limits road speed to any value consistent with safety and regulations while, at the same time, making available the higher engine speeds required for low gear operation.

Where you want a flashing light you want TUNG-SOL Reliability

The 90 million Tung-Sol Flashers installed on American cars have established records for reliability that make Tung-Sol Flashers first choice for both initial equipment and replacement fields.



First used in 1939
... universally
used today!



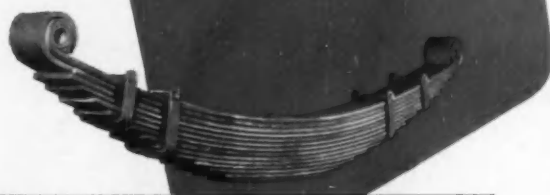
ELECTROSWITCH DIVISION of TUNG-SOL ELECTRIC INC., NEWARK 4, N. J.

WHO SAYS THERE'S

Nothing To It?



When you want reliability
... dependability ... specify
Steel Springs. Come to
Burton to get them!



Trucks, buses, trailers, off-highway equipment, and private motor cars of almost every prominent make use Burton Leaf or Coil springs as original equipment.

To hear 'em tell it, the fish would practically beg to get into the boat with you . . . there was really nothing to it! Maybe conditions were ideal . . . the lake wasn't choppy . . . the boat wasn't full of water . . . and the fish were friendlier than the one you'd hooked that was glaring at you . . . maybe.

Automotive suspension would be simple, too, if conditions were always ideal . . . always smooth roads, moderate speeds, light loads, even grades. But, since they aren't, it's just prudent business to entrust your spring requirements to people familiar with this specialized field.

Burton experience in spring design and engineering is ever at your service—backed by modern equipment and scientifically controlled methods to translate this "know-how" into a dependable and uniform product. Your inquiry is invited.

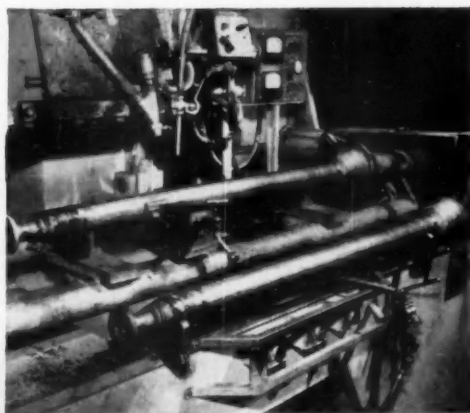
BURTON

AUTO SPRING CORP.

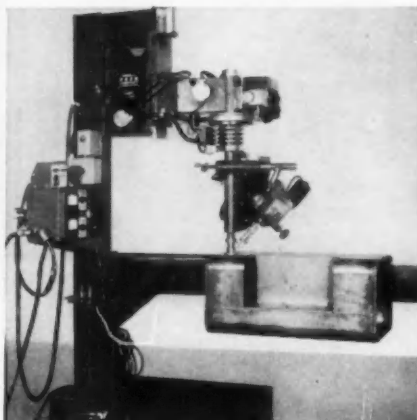
... Vital Support for the Automotive Industry ...

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Rear axle and differential housings assembled and welded with Lincolnweld automatic submerged arc welding.



Torque tube assembled by automatic welding. Accurate control saves wire and flux.



Automatically welded fuel tanks have stronger seams to resist leaking or bursting under impact.

Quality welds without pits or flaws required on bright parts which must be ground smooth and plated are made at low cost with Lincolnweld.



Sure starts..Precise control

assure continuous, low-cost automatic production

Lincolnweld puts Automation in Arc Welding

Low-cost automatic production calls for absolute dependability of operation . . . with minimum supervision. For efficient, automatic welding, Lincolnweld assures this dependability with sure arc starting on every cycle . . . *plus* . . . precise arc control for top quality welds at top welding speeds.

Bulletin SB-1355 tells how automatic Lincolnweld can be applied to many types of work. Write for it.



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The World's Largest Manufacturer of Arc Welding Equipment

When
Lincolnweld
welds faster

Has more
accurate
controls

Yet costs
less to
operate

WHY
don't you tool-up with
Lincolnweld automatic welders?

Automatic Production of Bearing Cups

(Continued from page 62)

parts which may be off-tolerance are separated out and segregated into four individual baskets according to gaged measurements; while on-gage parts are allowed to pass through to the next station. These air gage units, jointly developed by Timken and Moore Products Co., can each inspect 42 cups per minute. One per line is used on four of the cup lines; two are used on the small-cup line.

After air gaging, the parts are lifted to circular storage racks where they receive an oil rinse. From the storage racks they flow by gravity to visual inspection stations where operators check all surfaces of the cups for defects. Six stations total are provided on the cup lines for this purpose. In the visual inspection the inspector rolls the pieces, several at a time, down a double turn-around runway by means of an artists' brush, the action of the runway allowing both sides of the cups to be viewed. Experienced operators examine parts at the rate of about 1200 per hour.

Final Operations

Following the visual inspection, the cups are de-magnetized, washed, dried and slushed in oil in specially-designed equipment. The parts are then wrapped in waxed paper impregnated with a preservative, on Timken-designed machines which automatically package the cups in rolls 12 in. long to fit standard size cartons. Wrapped cups are finally put into corrugated shipping cartons, which in turn are placed on pallets for transfer to the truck pickup dock at the extreme end of the cup lines.

Standardization

One important phase has an influence on the efficient operation of a plant of this type. The need for high volume piece production is obvious. Standardization of sizes, recommended and urged by Timken, has gone a long way in achieving this goal. A total of 14 different cup and cone sizes now

constitute 80 per cent of the production volume at the Bucyrus plant. There are still, nevertheless, 34 different cup sizes being produced. The company hopes that with increased standardization of application, the production requirements will be limited to 12 to 14 sizes total.

The facilities of the Bucyrus plant and the standardization program have given end-product manufacturers substantial cost savings. In spite of general in-

creases in labor and material costs, a set of Timken bearings for low and medium-priced 1957 cars costs less today than in 1953. Economies have been made possible by the introduction of new light-weight, high-capacity bearings, standardization of sizes, and a high-rate efficient production setup. Additional reductions in the number of required bearing sizes, with coincident fewer line changes, could reflect further economies.



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TAPPETS

Johnson Hydraulic Tappets are dependable and are of the highest quality, both in materials and in workmanship.

Johnson also makes a variety of other styles of tappets, barrel type and mushroom, of various materials, to suit the requirements of your engines.

Let us assist you in the development
of the tappets for your new engines.

"Tappets are our business"

JOHNSON  PRODUCTS
INC.

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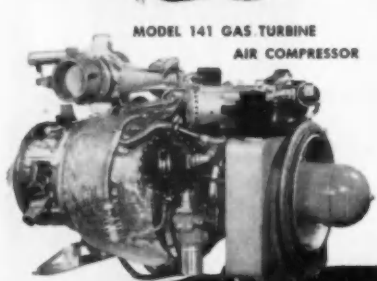
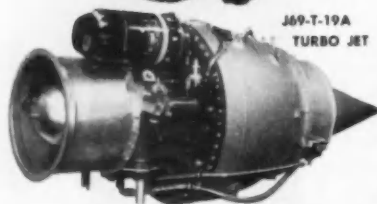
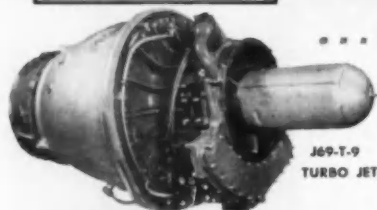
*Now
On Duty*



*with the
Air Force*

THESE ENGINES ARE
NOW IN PRODUCTION
AT C. A. E.

... the T-37 Twin Jet Trainer
with
C. A. E. Turbine Power



Air Corps flight training routine took a significant step forward recently, when the T-37 twin jet trainer entered its Phase VIII testing at Bainbridge Air Base, Georgia. Twenty hand-picked officers embarked on a course known as PROJECT PALM, with the two-way goal of training for them, and suitability testing for the plane. This new high-performance ship advances the jet phase of fliers' training to an earlier stage in the training schedule, speeding the transition from propeller-driven planes to jets, with gains in both safety and economy. Twin J69-T-9 turbines by C.A.E. provide the power.



CONTINENTAL AVIATION & ENGINEERING CORPORATION

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The BUSINESS PULSE

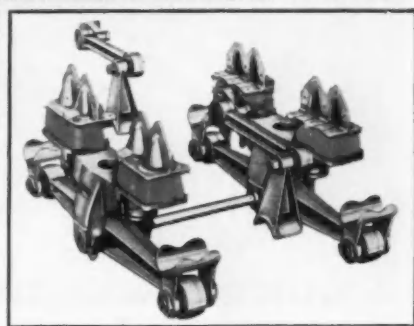
(Continued from page 98)

as were reports of continuing difficulties in the copper industry.

There were some offsetting favorable news items, such as reports of good sales in retail outlets at the beginning of the school year and also of improvement in automobile sales, but these did not dispel the impression that the autumn period had opened less auspiciously than it generally does. It is necessary to keep in mind, however, that this judgment is of preliminary character and that the real test will not come until well into the fourth quarter, when new-model automobile production gets into full swing.

Of course, investor hesitancy in September was conditioned not only by post-Labor Day developments but also by incoming statistical reports that related to conditions as they existed in the summer period. Since these, too, were of mixed character, they also probably contributed to the uncertainty.

The release early in the month of the latest joint report of the Department of Commerce and the Securities and Exchange Commission pertaining to businessmen's investment intentions may have had a dampening effect upon sentiment since it seems to confirm the tapering off of the capital-goods boom, which until recently at least has been the single most important factor of dynamism in the economy. Downward revisions from earlier estimates were made for both the second and third quarters of this year in sufficient degree to flatten out the previously rising spending curve. And since the two agencies also reported that businessmen were not planning to raise their spending to higher levels in the fourth quarter, it would seem that a plateau has been reached. Capital spending, in other words, apparently has already ceased to be a factor of expansion in the economy, and the relevant question (Turn to page 140, please)



The unique design of the "load cushion" accounts for smooth, even rides in the full range of loads, empty to full. Enjay Butyl Rubber (in red) made it possible.

ENJAY BUTYL "LOAD CUSHION"

replaces steel springs in big Tractor Trailers

The "load cushion" is an important innovation in tandem suspension. Developed by the Hendrickson Mfg. Company, it is made of Enjay Butyl and replaces steel leaf springs. Utilizing the great strength and impact resistance of Enjay Butyl, the "load cushion" gives the ultimate in a soft, easy ride within the complete range of loading, from empty to full. Besides giving a smoother, steadier ride, it increases tire mileage, reduces weight and significantly reduces wear and tear on equipment.

Enjay Butyl has proved to be the answer to problems in many fields of industry. It may well be able to cut costs and improve the performance of your product. Low-priced and immediately available, Enjay Butyl may be obtained in non-staining grades for white and light-colored applications. Get all the facts by contacting the Enjay Company. Complete laboratory facilities and technical assistance are at your service.



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Enjay Butyl is the super-durable rubber with outstanding resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

Employment to Expand in Automobile Industry

EMPLOYMENT in the American automobile industry will keep to its long, upward course.

Thousands of jobs for new workers in this field are to be provided in the remainder of this decade and in the 1960s. Worker totals in the coming years will be substantially higher than the average of about 800,000 for the year 1956.

These are the conclusions the U. S. Labor Dept. reaches in an analysis of job prospects in the automobile industry. Its findings for this and other major areas of employment are presented in the newly-issued 1957 edition of the agency's Occupational Outlook Handbook.

Most important of the factors in-

fluencing the hiring of auto workers is the demand for automobiles, this publication notes. Demand is affected by the levels of economic activity and of income, household formation, growth of the suburbs, and multiple car ownership. After examining these elements, the Labor Dept. foresees a rise in demand and in production to meet that demand.

Hiring is unlikely to climb at as swift a rate as output, though. A primary reason for this, says the new handbook, is the switch to more automatic assembly methods which permit increased production per worker. Plans for more efficient plants indicate that in certain operations fewer employees may be needed.

But at the same time the assembly of larger, heavier cars with very complex internal equipment may in part counteract the efforts to gain more productivity. Power steering, automatic transmissions, and air conditioners are examples of the devices that work against a lower manhour need.

Employment of auto engineers and of skilled workers—tool and diemakers, millwrights, pipefitters, and electricians—is to go up at a faster rate than will the hiring of many other groups. The number of assemblers, for instance, probably will rise at a comparatively slower pace.

Handling the office workload in the industry is to be a bigger task, the Labor Dept. predicts. The numerical increase of clerical and administrative workers will be speedier than with the growth of production workers. A rising need for accountants, stenographers, and business machine operators must be met.

Besides the jobs that will be created through industry expansion, there will be thousands of others to be filled because of the transfer, retirement, or death of employees. Between 14,000 and 17,000 job openings per year will result from deaths and retirements alone, up through the mid-1960s.

WHAT'S Your COUPLING APPLICATION?

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SPECIFICALLY ENGINEERED
... NEVER MERELY ADAPTED
... FOR EACH PARTICULAR
TYPE OF APPLICATION

QUICK-CONNECTIVE COUPLINGS

For Pneumatic or Hydraulic Line Service

Regardless of whether your particular application requires One-Way Shut-Off, Two-Way Shut-Off, or Straight-Through Couplings—or Couplings for special service on fluid lines carrying oxygen, acetylene, gasoline, steam, etc.—you can always select a Hansen Coupling specifically engineered for your requirements.

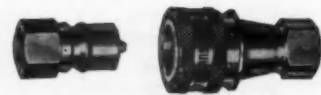
As the result of years of experience with fluid line layouts in thousands of plants, each type of Hansen Coupling is carefully designed to incorporate the specific features needed for the job it is intended to do.

The next time you plan to alter or install a fluid line hook-up, make use of the know-how of your nearest Hansen representative. You'll find him a real help in getting *exactly* the Couplings you need to do the job.

Write for the Hansen Catalog
Here's an always ready reference when you want information on Couplings in a hurry. Lists complete range of sizes and types of Hansen Quick-Connective Couplings. Write for your copy.
Representatives in Principal Cities



ONE-WAY SHUT-OFF



TWO-WAY SHUT-OFF



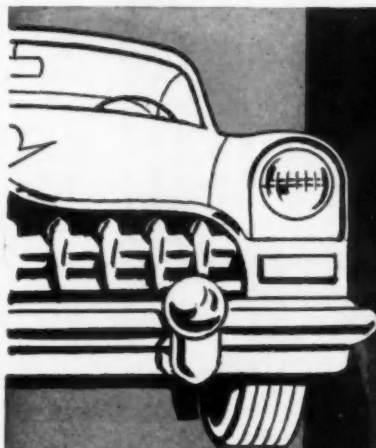
STRAIGHT-THROUGH COUPLING

QUICK-CONNECTIVE FLUID LINE COUPLINGS

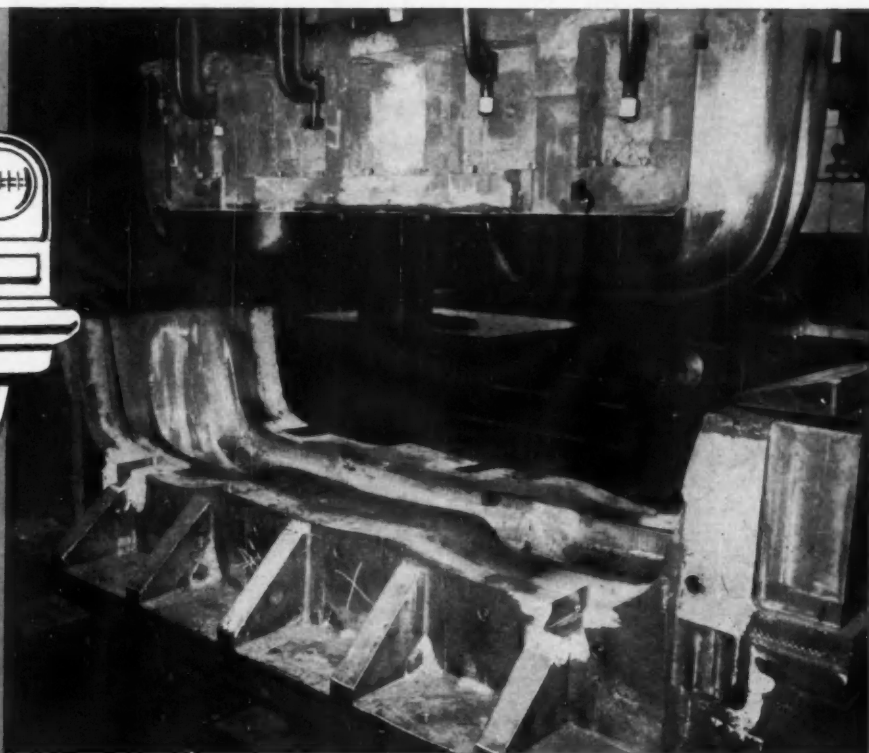
SINCE 1915 **h** THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

Try this money-saving method that auto-makers use



*Automobile
bumper die made
of FCC 66 Cast-To-Shape
tool steel hardened to 57-58
Rockwell C. Average
production: 50,000 units
before redressing.*



A-L CAST-TO-SHAPE TOOL STEELS

SEND FOR THIS NEW CATALOG "FORGING AND CASTING PRODUCTS"

Contains the latest information on FCC Air Hardening, Oil Hardening and other Cast-To-Shape Tool Steel Specialties that can save you time and money . . . also Composite Die Sections and Smooth Hammered Forgings in a wide range of tool and stainless steels. Don't wait—get your copy NOW.

Write Today
ADDRESS DEPT. AI-94

Auto makers, too, are included in the long list of manufacturers enjoying the advantages and economies of A-L Cast-To-Shape tool steels. By this modern, money-saving method of tool and die making, it is possible to cast even intricate shapes to within an eighth of an inch of finished size. The savings in time and material over that of machining from solid stock are readily apparent.

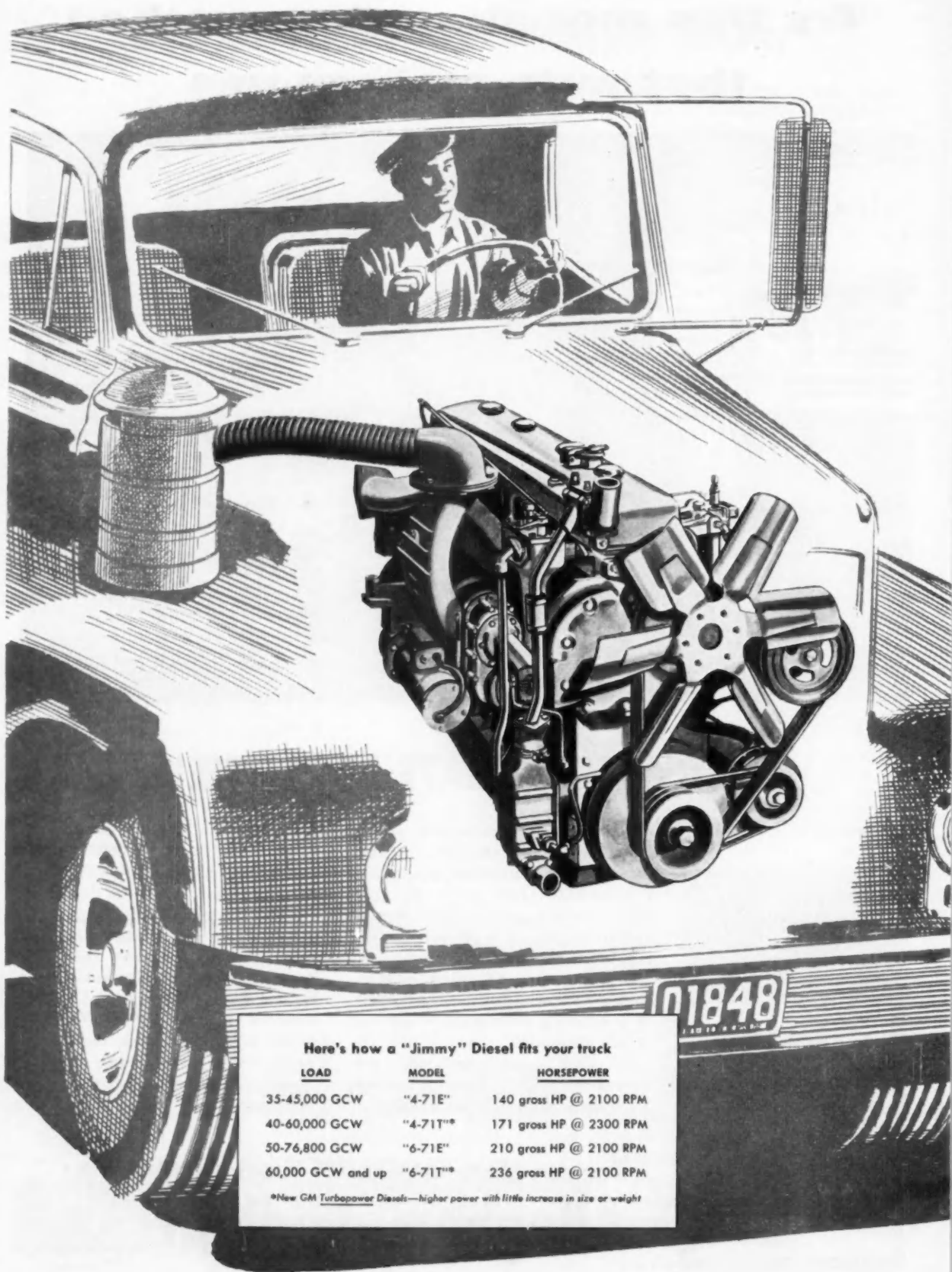
A-L Cast-To-Shape tool steels are offered in a variety of grades, and are electrically melted to precise labora-

tory standards. They are remarkably resistant to abrasion and possess great compressive strength. In many cases, they out-perform tools and dies made from solid bars and forgings.

Remember, with A-L Cast-To-Shape tool steels, you buy less steel originally, and you have less machining to do for finish. Ask your A-L representative about them TODAY . . . or write *Allegheny Ludlum Steel Corporation, Forging and Casting Division, Wanda and Jarvis Avenues, Detroit 20, Michigan.*

For complete MODERN Tooling, call
Allegheny Ludlum





Here's how a "Jimmy" Diesel fits your truck

LOAD	MODEL	HORSEPOWER
35-45,000 GCW	"4-71E"	140 gross HP @ 2100 RPM
40-60,000 GCW	"4-71T"*	171 gross HP @ 2300 RPM
50-76,800 GCW	"6-71E"	210 gross HP @ 2100 RPM
60,000 GCW and up	"6-71T"*	236 gross HP @ 2100 RPM

*New GM Turbopower Diesels—higher power with little increase in size or weight

This new "Jimmy" Diesel is available for any make truck 26,000 GVW and up

New GM "71E" Diesel can cut gasoline engine operating costs in half

This General Motors Series 71 "E" engine for trucks and buses is the newest version of the time-proved GM 2-cycle Diesel, popularly known as the "Jimmy" Diesel to users the world over.

It will save more money, perform better at all speeds and last longer than any other engine on the road today—for these important reasons:

- **Modern 2-cycle advantages** — more power per size and weight—*twice* as many power strokes per crankshaft revolution as 4-cycle Diesels—smoother running—faster accelerating—better high-altitude performance.
- **New 4-valve cylinder head** and 38% larger air intake capacity for improved combustion and the cleanest "breathing" known—smoke-free exhaust.
- **Unit fuel injection** — with new free-flow spray tips—more "go" per gallon—maximum output on minimum fuel.

• **Lower maintenance costs**—simpler design requires fewer maintenance hours, and maximum interchangeability of low-cost parts assures lowest costs over the entire life of the engine.

Here is a more compact, lighter-weight Diesel that will fit any heavy truck you own or buy—and compared to gasoline engines, *it will cut your operating costs as much as 6¢ a mile!*

See your GM Diesel distributor about repowering your present equipment. When you're in the market for new trucks, ask for this great new GM "71E" Diesel. And if the truck you choose isn't immediately available with a "Jimmy," turn your truck over to the GM Diesel distributor for a "71E" installation.

DETROIT DIESEL

Engine Division of General Motors, Detroit 28, Mich.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

Regional Offices:

New York, Atlanta, Detroit, Chicago, Dallas, San Francisco

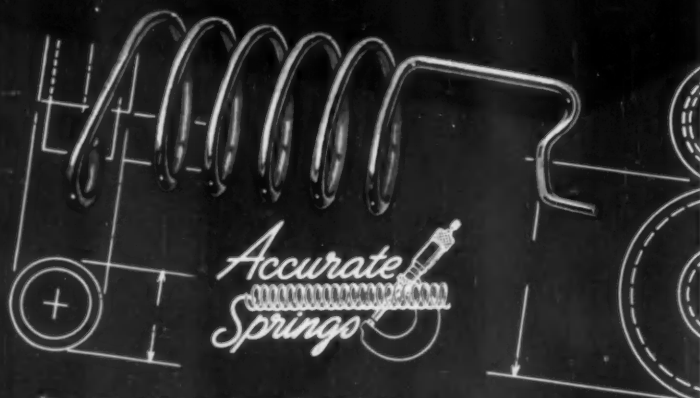
Now—more than ever—it pays to
standardize on GM Diesel



Parts and Service Worldwide

—available in 1485 applications of
power equipment built by more than
175 manufacturers

Design for a Successful Spring



- ▶ Engineering Service
- ▶ Tooling for Large Quantities
- ▶ Planning and Scheduling
- ▶ Quality Control
- ▶ Packaging ▶ Delivery

These are the basic elements necessary to design and produce a precision built spring. To supply the above elements takes skill, experience and imagination . . . ingredients that Accurate Spring provides every one of their customers every day.

Accurate makes millions of springs a month—precision springs held to close tolerances by rigid quality control and inspection. Production schedules for large quantities are planned well in advance. Customers are assured of deliveries scheduled to their needs.

Proper packaging is necessary too, for ease of handling and speeded production. Untangling springs can be irksome and expensive.

These facilities are here to serve you. Just write, outlining your requirements and specifications.



SPRINGS
WIRE FORMS
STAMPINGS

ACCURATE SPRING MFG. CO., 3810 W. Lake St., Chicago 24, Ill.



More than 96 per cent of vehicles involved in fatal accidents on U. S. highways in 1956 were in apparently good condition.

Bad driving conditions prevailed in less than 15 per cent of the fatal highway accidents in the U. S. in 1956.

Week-ends are the most dangerous time to be on U. S. highways. In 1956, more than 56 per cent of all fatalities occurred on Fridays, Saturdays and Sundays.

Aircraft parts today are finished to closer tolerances than the tools used to build aircraft during World War II.

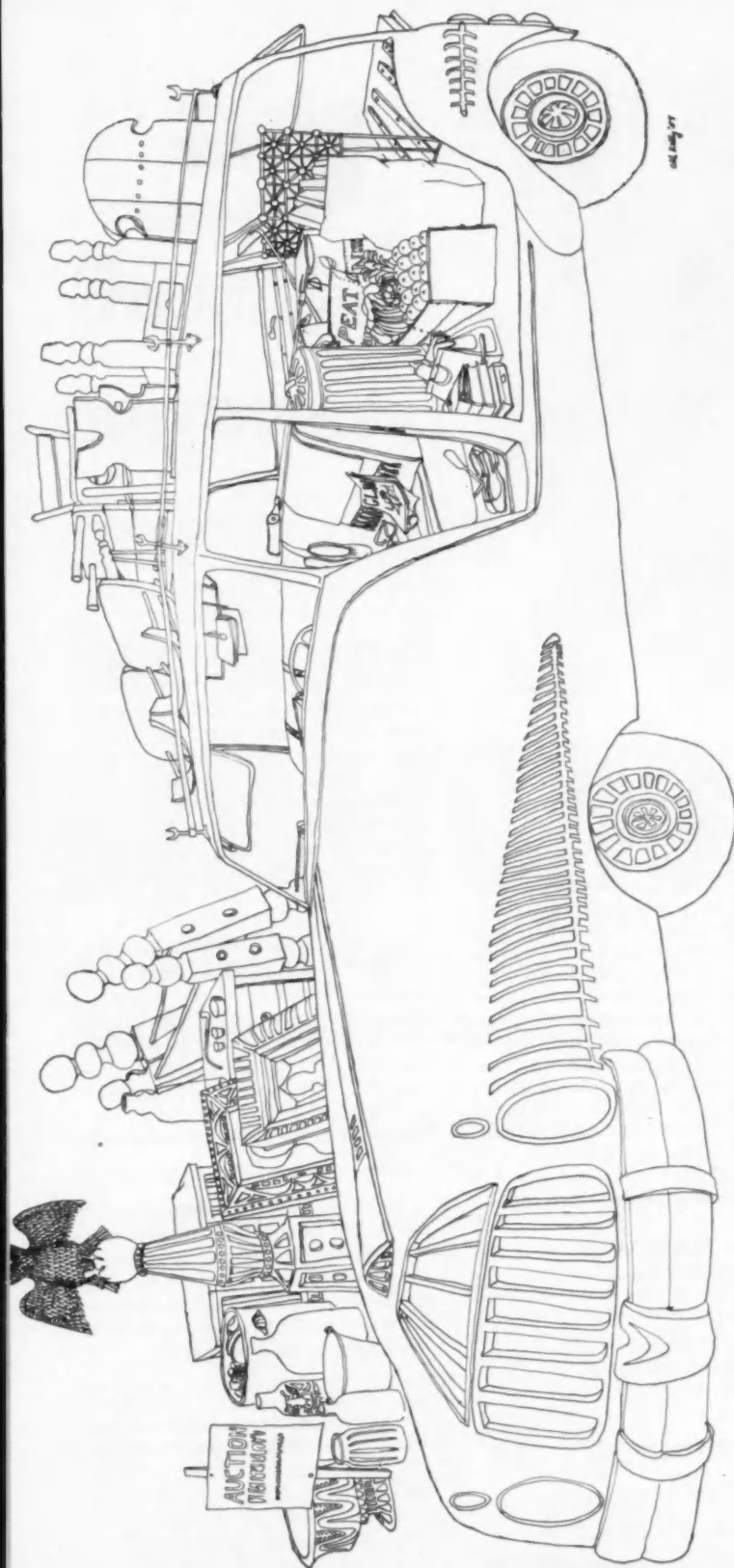
With an estimated 1957 production of 6.5 million passenger cars, it will take some eight million gal of crankcase oil, 12 million gal of automatic transmission oil, and 24 million lb of rear axle lubricant just to make the cars road-ready before leaving assembly plants.

Big jet planes will use some 12,000 gal of jet fuel for a 6½-hour flight from New York to Paris while flying about 600 miles an hour.

More than seven out of every ten families in the U. S. own at least one automobile.

Slightly more than 9.5 million gal of brake fluid were turned out by U. S. manufacturers last year for use in new cars and as replacement fluid in older automobiles.

U. S. trucks traveled a total of 115 billion miles in 1956, a figure that closely parallels economic activity and prosperity in the nation. Truck miles traveled have doubled and gross national product has increased approximately 40 per cent since 1946.



Don't scratch your nose

We mean don't scratch your nose at an *auction*, or you may end up, as in the drawing, with a house full of eagles, urns and George-Washington-slept-in-it bedsteads. But what a wonderfully capacious station wagon they have to lug it all home in!

Of course, the vehicle isn't real. But there's nothing make-believe about the Stainless Steel you see on *all* cars. No other metal resists denting and corrosion so well, and Stainless is surely the easiest of all metals to keep clean and bright. Then

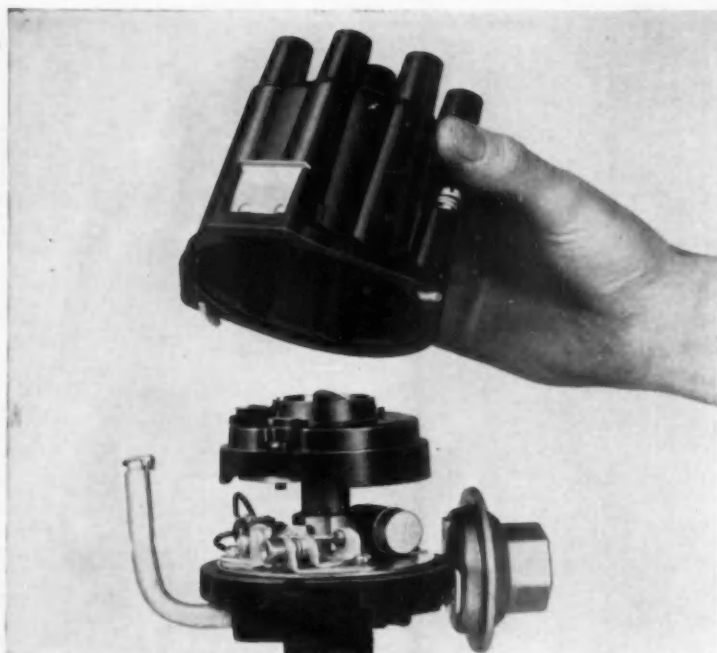
too, Stainless trim is often cheaper to fabricate than plated parts.

As a *source* for Stainless Steel, we would like to recommend ourselves: United States Steel, a reputable concern that can furnish the finest references. We also have a crack metallurgical staff, and the widest range of Stainless types, grades and finishes. If you'd like a large reproduction of the above drawing, write to United States Steel, Room 2801, 525 William Penn Place, Pittsburgh 30, Pa.

Drawing by Marie Tuicillo Kelly.
Reproductions available on request.



USS STAINLESS STEEL



Where else can **DUREZ PHENOLICS** do the job best?

Here is an automotive necessity that could start you on a profitable line of inquiry.

When you look into it, the same properties that make Durez phenolic plastics unsurpassed for the distributor cap, rotor, and coil top could well be applied to other applications resulting in fewer assembly operations, dependable long-term performance, and reduced unit cost.

Because they mold readily in complex shapes and need little or no finishing, Durez phenolics are economical to use.

They are dimensionally stable—can be specified with confidence for close-tolerance components. Resistance to impact and to extremes of temperature, electrical non-conductivity, and chemical inertness are other properties where Durez measures up to engineering standards.

These unique properties are provided in remarkable combinations in new Durez thermosetting molding materials formulated with glass fiber and other reinforcing fillers. Your molder can provide valuable help...or call on our field service for technical counsel.

CHECK TO SEE HOW YOU CAN USE THESE PHENOLIC PROPERTIES:

- Dimensional stability
- Non-conductivity
- Resistance to heat and cold
- Impact strength
- Resistance to moisture
- Chemical resistance
- Moldability in intricate shapes
- Moderate cost



® Phenolic Plastics that Fit the Job

DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

2010 Walck Road, North Tonawanda, N. Y.

HOOKER
CHEMICALS
PLASTICS



**ON OUR
WASHINGTON WIRE**

Navy hopes for a guided missile with a range of up to 1500 miles are pinned on the Polaris, still under development. Polaris is to be launched from either surface vessels or submarines at important surface targets. It will use a solid propellant, which the Navy considers safer for shipboard handling than a liquid propellant.

Defense Secretary Wilson has directed that total outlays for the half year ending next Dec. 31 are not to exceed \$19 billion. To remain under the top figure, the armed services face the prospect of reducing spending for high-priced items, cutting out or combining some projects, or both.

Getting money to do business is their Number One headache, small companies tell the Government. Little companies name their main difficulties in this order: financing, personnel, sales, research, Government meddling, and output. Their answers are in response to a survey of 707 firms.

Top mobilization officials aren't ready yet to say the Government stockpilebuying program is dead, but there is every indication that it will shrink rapidly until procurement is limited to only one or two extremely scarce materials.

Building-block machine tools won't come into widespread use any time soon, according to Government tool experts. They agree that the building block principle (interchangeable heads on permanent bases) is probably well suited to automobile assembly lines, but they question the merit of such tools on other types of assembly lines.

Right, 1/2-in. pitch,
1 1/16-in. wide
timing chain

This narrower timing chain has saved MILLIONS of dollars for leading car makers

*It's one of the reasons why so many
automotive designers are turning to
LINK-BELT 1/2-inch pitch timing chain*

SAVING even a fraction of an inch of car length can mean a substantial reduction in production costs. And by permitting use of narrower sprockets, shorter camshafts, crankshafts—and cutting overall length, where desired—Link-Belt 1 1/16-inch width timing chain has brought significant economies to many car manufacturers.

Originated by Link-Belt in 1949, this narrower, 1/2" pitch design has been adopted by more and more leading auto makers. And the fact that it has accommodated a better-than-100% horsepower increase on some engines testifies to its exceptional durability.

For more complete information, write for Book 2065.



TIMING CHAINS AND SPROCKETS

LINK-BELT COMPANY: 220 South Belmont Ave.,
Indianapolis 6, Ind.

14, 505



GREATER CAPACITY IN PIN BEARING AREA of Link-Belt's 1/2-in. pitch chain permits use of a narrower width than conventional 3/8-in. pitch designs.

The BUSINESS PULSE

(Continued from page 130)

now is whether a decline should be anticipated.

Declining Backlogs

A report by the Department of Commerce on the operations of manufacturers during July is also

subject to unfavorable interpretation both with respect to new orders and inventories. New orders received by manufacturers during the month ran two per cent below those a year earlier, and for the seventh successive month they were exceeded by shipments. As a consequence, manufacturers' backlogs of unfilled orders (which were also affected by military cancellations) continued to decline. As of July 31, backlogs stood at \$59.3 billion, down approximately \$1 billion for the month and about

\$3 billion from the end of July, 1956.

Increasing Inventories

Moreover, manufacturers' inventories continued to rise during July, showing a gain of about \$300 million on a seasonally adjusted basis, approximating the average increase of the preceding months of 1957. Admittedly, some part of the monthly rise probably reflected higher prices, but this does not fully negate its significance. What seems particularly important is that the continuing uptrend in inventories occurred despite the reduced level of industrial production that has prevailed since the second quarter of the year.

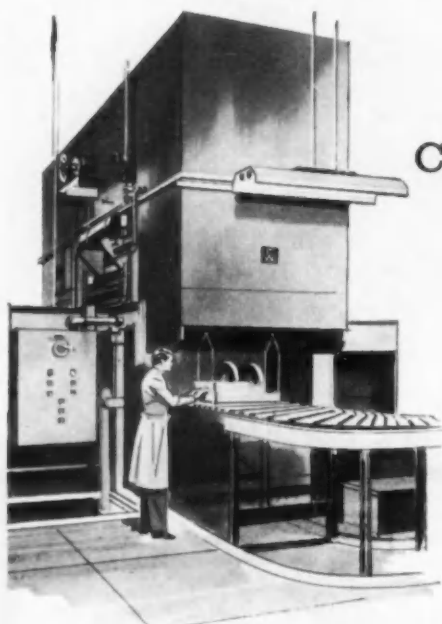
While the spottiness which now characterizes some areas of the economy has caused a considerable measure of uncertainty, it has not, so far at least, produced any widespread expectation of imminent decline in general business. This absence of outright pessimism is understandable, for there are still some major sustaining forces clearly at work in the economy.

High Rate of Spending

Without any doubt the most important plus factor in the business situation at present is the record high rate of consumer spending, which is featured by particular strength in nondurable goods and services. Retail trade is not only holding up well but actually seems to have been gathering a degree of upward momentum. In contrast with comparatively static sales in the latter part of 1956 and the early part of this year, retail sales registered consecutive increases in every month from April through August, according to estimates made by the Department of Commerce.

On a seasonally adjusted basis, the total of sales for August is reported at \$17.2 billion, as compared with a first-quarter average of only a little more than \$16.3 billion. Even after allowance is made for the price advances which have occurred, this represents an impressive gain. If it continues in future months, it could go a long way toward offsetting any de-

(Turn to page 144, please)



Curtiss-Wright Ultrasonic Degreaser DB4-60 cleans hundreds of metal parts in minutes

Ultrasonics — the science of high frequency vibrations — is today revolutionizing cleaning techniques. Curtiss-Wright ultrasonic cleaning and degreasing equipment has developed to a point where it is now practical for all types of production parts. High precision instruments, hair-thin electronic components and mass produced parts are thoroughly cleaned in seconds.

Pictured above is the new Curtiss-Wright Degreaser DB4-60 which cleans and degreases 95% of the precision parts of a Curtiss-Wright Turbo-Compound aircraft engine prior to assembly.

Where formerly this operation took hours, these parts are now cleaned in minutes — and cleaned more thoroughly.

The Curtiss-Wright line of standard and custom ultrasonic cleaning and degreasing units varies in size from 8" x 8" x 10" to an ultrasonic area 38" x 66" x 36". Automatic conveying equipment and servo controls are utilized where required by production volume.

Discover how Curtiss-Wright cleaning and degreasing equipment can lower your costs and speed your operation. Our engineers are available to give prompt consideration to your problems.



See our equipment at Booth 602,
Chicago Metal Show



CANADIAN REPRESENTATIVE: CURTISS-WRIGHT OF CANADA, LIMITED, MONTREAL



This Cleveland, now driving an octagonal thickener in a New England paper mill, is a real "old timer". Originally installed nearly 40 years ago in a different application, it is still on the job after so many years of constant service.

Where you can use a Worm Gear Drive to best advantage

WHEREVER power transmission calls for a compact, safe, space-saving speed reducer, a Cleveland worm gear drive is your first choice.

The right angle construction of a worm gear saves space. High shock load resistance and efficient performance are inherent. Parts are reduced to a minimum. There's smooth, uninterrupted torque flow and quiet running. Correct gear alignment is maintained. Gearing is enclosed in an oil bath, assuring positive lubrication, minimum maintenance and safety for operators. The case hardened steel worm and nickel-bronze gear actually improve with use, adding to long life. And, with Clevelands, you get the extra advantages of the 42 years' experience of specialists in building worm gears.

In thousands of cases, Cleveland speed reducers have operated for the life of the driven machine through years of severe service. Get the complete Cleveland story, before you install a speed reducer; see how much Clevelands can do for you. Write for helpful technical advice and ask for Catalog 400. The Cleveland Worm and Gear Company, 3274 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.



CLEVELAND

Worm Gear

Speed Reducers

*Capacities:
#4 screws
to $\frac{3}{8}$ " bolts.
Reversible and
non-reversible
types.*



Driving nuts to proper torque helps Bradley Laboratories, New Haven, Connecticut maintain quality standards and reduce the cost of assembling their selenium rectifiers.

After rectifier components are "stacked" on a stud, the final step in assembly requires the tightening of a retaining nut. To assure proper electrical characteristics, this nut must be tightened within close torque limits. Bradley Laboratories has found that the Magnamatic "one-shot" clutch consistently applies the exact torque output necessary to assure that **every** rectifier fully meets specifications . . . with Magnamatic, assemblies are never too loose . . . never too tight . . . always just right!

Operators at Bradley like the high-speed rundown and clean disengagement of the Magnamatic "one-shot" clutch because it means absence of annoying clutch buzz and ratcheting that can also overdrive fasteners. Production supervisors appreciate Magnamatic's ability to stay on the job! CP Magnamatics have been at work at Bradley for over a year without a bit of time off for maintenance.

MAGNAMATIC....

THE KEY TO

QUALITY CONTROL

at Bradley Laboratories



Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Chicago Pneumatic Tool Company Dept. M-64
8 East 44th Street, New York 17, New York

— Please arrange demonstration. No obligation, of course!

— Please send me FREE booklet SP-3165 "Magnamatic Case Histories"

— Please send me FREE Bulletin 580 on "Magnamatic" units for multiple application.

Name

Company

Address

City Zone State



A TALENT FOR INVENTION: Leroy® Lettering Equipment—a K & E development—insures perfect neatness and uniformity, yet it is simple to operate and requires no special skill or training. One man can start a job and another finish it without any variation in lettering.

This K & E equipment comprises three basic, precision engineered parts: Leroy template, Leroy pen and Leroy scribe. Capitals, lower case, numerals, vertical or forward slanting letters can be drawn from a *single* template—an *exclusive* K & E feature. You can buy templates, pens, and scribes separately or in convenient sets.

Leroy templates offer a variety of alphabets, sizes and graphic symbols. Electrical, mathematical, mapping, geological and other symbol templates are available. Templates, with words or phrases that are frequently repeated, as well as templates with your own symbols, trade marks or designs, can be made to your order.

To save time and money in your drafting room specify K & E Leroy® Lettering Equipment. For other drafting or engineering equipment and materials also look to Keuffel & Esser Co.—your “Partners in Creating”—who have served engineering for 90 years.



KEUFFEL & ESSER CO. New York, Hoboken, N.J., Detroit, Chicago, St. Louis, Dallas, San Francisco, Los Angeles, Seattle, Montreal.

The BUSINESS PULSE

(Continued from page 140)

clines that may occur in plant and equipment spending and military outlays. With this in mind, it will be particularly important to watch the performance of sales during the remaining months of the year, when they are traditionally very large.

Record Income Levels

Continuing high over-all employment and accompanying record income levels are also significant plus factors in the present situation. Of course, employment and income levels are not automatically self-perpetuating, but they do have some foreshadowing significance for the short term. And at their present high levels, they at least suggest that economic conditions in general are unlikely to deteriorate appreciably before the end of the year. The recent improvement in home-building activity also deserves mention as an element of strength, since it seems to suggest that the substantial decline of 1956 and early 1957 has been arrested and perhaps even reversed. In August private nonfarm housing starts climbed above the million mark on a seasonally adjusted basis for the first time this year.



Hoover Bearing Head Predicts Sales of \$26 Million in '58

Hoover Ball & Bearing Co. president Clifford H. Simmons predicts his company's sales will hit \$26 million during the 1958 fiscal year and \$35 million the following year.

The ball bearing division's new plant near Ann Arbor, Mich., which will be ready for production in early 1958, will double that division's capacity, according to Simmons, and permit bearing sales of nearly \$18 million.

Hoover reported earnings of \$1,618,842 on sales of \$22,269,212 during the fiscal year ended July 31. The company recently changed its fiscal year from Dec. 31 to July 31. During the last full fiscal year, however, earnings totalled \$827,696 on sales of \$17,430,573.



MULTIPLE SPINDLE UNITS

for modern assembly lines

✓ **reduce costs**

If "one-at-a-time" rundown of nuts and bolts on your assembly line results in labor costs higher than you like to think about . . .

If your production schedules would benefit from increased speed and efficiency in multiple nut setting, bolt tightening, or similar operations . . .

If your product needs the quality control afforded by the simultaneous application of uniform torque to all nuts or bolts . . .

Why not call on Cleco, pioneer developers of modern, pneumatically powered multiple spindle assembly equipment?

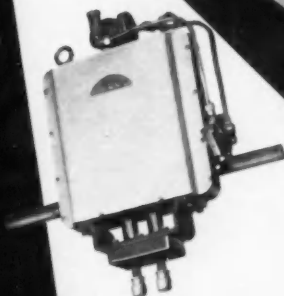
Cleco will custom engineer a multiple spindle unit for your specific application, whether you require a manually-controlled, semi-automatic, or automatic machine—whether your operation calls for 2 driving spindles or 24, or more.

Motor arrangement patterns are practically unlimited. The use of standard, proven Cleco Air Motors assures uniform operating efficiency, low maintenance costs, and immediate parts availability.

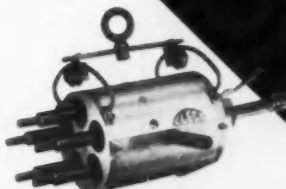
Illustrated are a few examples of the many custom-designed multiples Cleco has delivered. To get detailed information about what Cleco can do to speed production, improve quality control, and cut down costs for you, write Cleco Air Tools, P. O. Box 2119, Houston.

✓ **facilitate quality control**

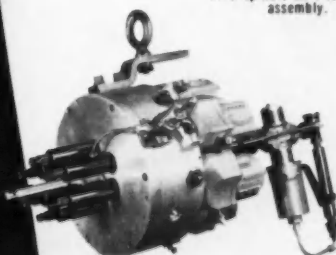
✓ **speed production**



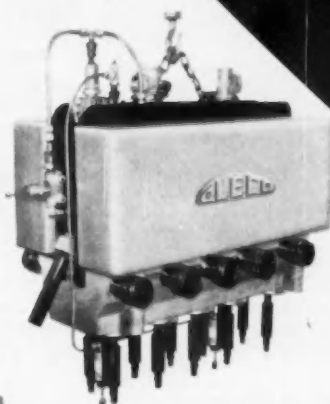
Two spindle nutsetter for automobile stabilizer bracket assembly.



Five spindle unit for wheel assembly.



Six spindle nutsetter for assembly of flywheel to crankshaft. Close center distance made possible by driving spindles through offset gears. Unit has stripping rod for easy disengagement from the work.



Ten spindle unit for installation of V-8 engine main bearing caps. Has air regulators mounted in manifold, stripping rod for disengagement.



Twenty-four spindle machine shows setting oil pan bolts on V-8 automobile engine. Has stripping rods for disengagement.



Division of Reed Roller Bit Company
HOUSTON

EASIER, QUICKER BAND ADJUSTING

Proto's simplified set makes factory recommended band adjustments on all automatic transmissions with fewer tools...less cost



PART NO.	DESCRIPTION
1. 9973	Partitioned Metal Box (10 1/8" x 8" x 1 1/2")
2. 2356	Wrench—open end (1/2")
3. 6061F	Torque Wrench (1/2" drive)
4. 2357	Band Adjuster
5. 4742	Allen Hex Socket (1/8" hex, 1/2" drive)
6. 4710S	Socket—8 point (9/16" op., 1/2" drive)
7. 4710	Socket—6 point (9/16" op., 1/2" drive)
8. 4743	Screwdriver bit (1/8" bit, 1/2" drive)
9. 5324	Socket—12 point (9/16" op., 1/2" drive)
10. 5322	Socket—12 point (1 1/16" op., 1/2" drive)
11. 2359	Handle and gage (1/2" drive, 1/2" gage)
12. 2354	Servo Gage—Front
13. 2355	Servo Gage—Rear
14. 2360	Manual
15. 2361	Chart

ANOTHER REASON YOU'LL
PREFER
PROTO
TOOLS

Precision band adjustments easy and profitable for any mechanic. Fully illustrated Manual #2360 shows you how. Chart #2361 gives factory specifications. Both included in this great, new Proto Set #2350. Develop new business at low cost.



DIVISION OF



2212 SANTA FE AVE.
LOS ANGELES, CALIF.

583 ALLEN STREET
JAMESTOWN, NEW YORK

P. O. BOX 366
LONDON, ONTARIO, CANADA

News of the MACHINERY INDUSTRIES

(Continued from page 93)

signed and built by The Taylor-Winfield Corp., the welder joins successive strips of alloys such as 61S, 24S and 75S in thicknesses from 0.010 to 0.080 in. and as wide as 64 in.

Either plain or Alclad aluminum strip is fed into the welding machine prior to heat treatment. A built-in shear square cuts the trailing edge of one uncoiled strip and the leading edge of the following strip. Four welding wheels move across the overlapped edges, joining the two pieces.

Mechanical transfer devices incorporated in the welder receive the strip, position it properly, and move it towards the continuous heat-treating line after it is welded. The operator controls all operations from a nearby production control station.

• • •

Capital outlays for new plant and equipment are expected to level off at a high rate during the second half of this year and to establish a record total of \$37 billion for 1957, according to a survey made public jointly by the Dept. of Commerce and the Securities and Exchange Commission.

Because evidence of corruption among labor leaders is still growing, the Congress is going to insist next year that steps be taken to end dishonesty in the union hierarchy. The only question now is: Will the unions successfully clean their own house, or will the federal government forcibly do it for them?

Final version of the revised Bulletin F, the table of suggested useful lives for depreciable equipment, probably won't be published until next spring. Purpose of the revision is to bring Bulletin F schedules up to date with modern production processes and machinery technology, and to recognize that some machinery becomes obsolete long before it is mechanically worn out.



AMBALLOY... A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS

FROM HIGH-GRADE CONVERSION FACILITIES... BETTER END PRODUCTS

The consistent quality of AMBALLOY steels—stainless, alloy and carbon—is rooted in the exacting quality control of our high-grade conversion facilities. The detailed attention we give to every step of the conversion process means better end products for users of Amballoy specialty steels.

Important too, is the fact that our facilities are available for your conversion needs. We'd like to discuss with you

the advantages of using our special processing operations.

And to provide you with helpful solutions to your material selection problems, Byers offers a staff of highly trained metallurgists. We can serve you with knowledge and facilities that put your order where you want it, when you want it. Check Byers first. Write or call for details. A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.

A growth company with the emphasis on quality and service **A. M. BYERS COMPANY**

New Test Facility Simulates Flight Through the Thermal Barrier

To investigate and overcome structural limitations of air vehicles at supersonic speeds and temperatures above 2500 F, the Westinghouse Electric Corp. has developed a complete elevated temperature test facility.

The equipment consists of

banks of tubular infrared lamps, three-channel ignitron controller, strip chart temperature recorders, regular control (computer) channels, master control desk, unit substation, bus duct distribution.

The test facility is designed to study the effect of high tempera-

tures on structural parts of aircraft and missiles. The Westinghouse unit is said to create heat conditions encountered by missiles and aircraft at least three times faster than standard systems now in use.

This increased speed eliminates time lags and thus more nearly simulates actual heat conditions met in flight. At the unusually high speeds now being reached by missiles, heat is generated much faster than it can be dissipated. As a result, metals distort, melt or vaporize completely. This area in which metals are subjected to such terrific punishment—in the vicinity of 2000 mph—is called the heat barrier.

The Westinghouse test facility—which can create 2500 F temperature in 12 seconds—will enable aircraft builders and designers to pretest structural parts and whole aircraft in simulated flights through the heat barrier.

Structural and Aerodynamic Effects

Heating of the aircraft surface due to friction and compression of the air is related to the difference between the effective air temperature and the skin temperature of the vehicle. Under transient flight conditions, the temperature of the aircraft varies with time. Because heat flow is variable, the temperature distribution throughout the aircraft is uneven. This condition results in differential thermal stresses arising in the structure which are superimposed upon aerodynamic structural loads. An elevated temperature test facility simulates all of these load effects in conjunction with the differential thermal stresses. The Westinghouse equipment is used to arrive at solutions of thermal transient distribution throughout different types of aircraft structures.

Infrared Lamps

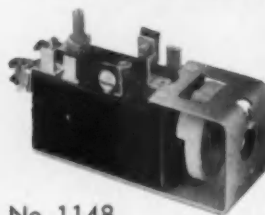
Banks of quartz infrared lamps are used as the heating source. Each lamp is rated at 1000 watts, 240 volts and is operated, in many cases, at 440 to 480 volts. These lamps operate satisfactorily at 600 volts and up to 900 volts, if necessary. In addition to the 10-

(Turn to page 155, please)



3 in 1 Control!

FASCO HEADLAMP SWITCH with Integral Circuit Breakers



No. 1148

Available for both
6 and 12 Volt systems.

It's new . . . but already this FASCO Headlamp Switch is accepted as "standard" by leading automotive manufacturers . . . proof of its dependable, trouble-free performance. Like all FASCO automotive electrical components, this 1148 Switch is designed right . . . built right, to meet the rigid requirements of today's cars and trucks. And that's why design engineers agree it pays to—

CONSULT FASCO . . . FIRST!

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INDUSTRIES, INC.

ROCHESTER 2, NEW YORK

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re-sells in a used car . . . design it, improve it and protect it
with McLOUTH STAINLESS STEEL.

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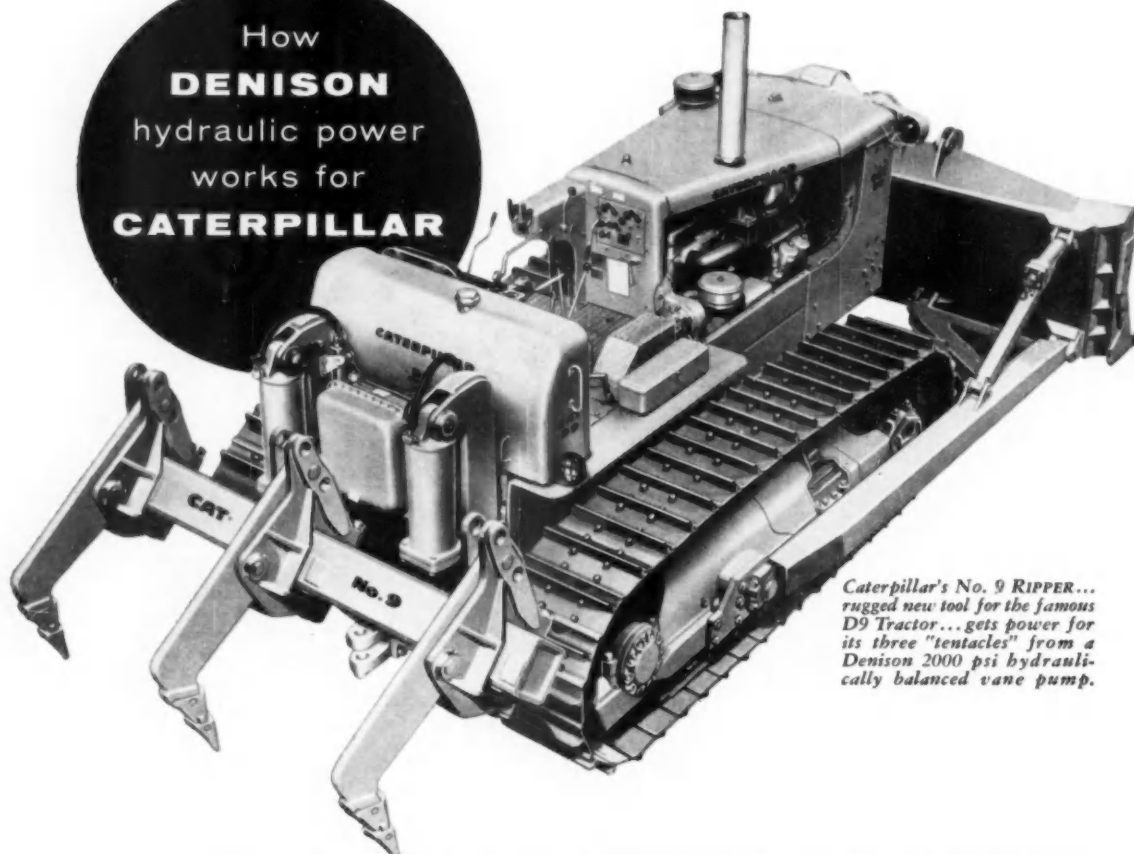
H I G H Q U A L I T Y S H E E T A N D S T R I P

for automobiles



McLOUTH STEEL CORPORATION DETROIT, MICHIGAN
MANUFACTURERS OF STAINLESS AND CARBON STEELS

How
DENISON
hydraulic power
works for
CATERPILLAR



Caterpillar's No. 9 Ripper... rugged new tool for the famous D9 Tractor... gets power for its three "tentacles" from a Denison 2000 psi hydraulically balanced vane pump.

PUTTING TEETH IN THE "RIPPER"

...another application for DENISON hydraulic power

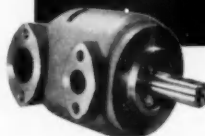
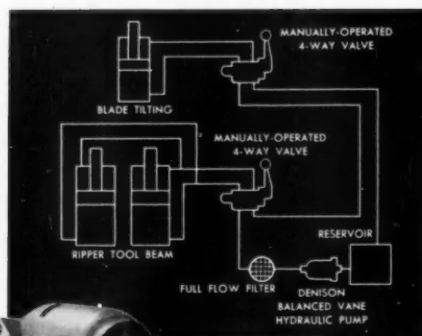
Caterpillar's rugged No. 9 Ripper—newest tool designed for their powerful D9 Tractor—proves again the basic design advantages of Denison's 2000 psi vane-type hydraulic pump.

The Ripper's three working shanks are powered by the Denison "T" series pump—capable of delivering up to 2000 psi continuously. Driven by the engine power take-off, the Ripper's pump actually operates at 1450 psi (relief valve setting) which provides generous reserve stamina to withstand heavy workloads with no danger of breakdown. With the Denison "T" series pump, Caterpillar designers assured the owner of cold-weather pump-starting ability without damage to the pumps. They assured speedy servicing in the field because the complete pumping cartridge is removable as a unit. It all adds up to lower operating cost and dependable performance.

There's less weight, less cost-per-horsepower—with smaller lines and valves with the Denison 2000 psi pump as the heart of a hydraulic system. Design flexibility is unlimited.

Have your Denison hydraulic specialist tell you more about the 2000 psi pump—and help you with any equipment or machinery design problem. Write Denison Engineering Division, American Brake Shoe Co., 1212 Dublin Road, Columbus 16, Ohio.

DESIGNERS—ENGINEERS! New Bulletin 201 describes "How to Design More Efficient Hydraulic Power Into Mobile Machinery." Write us.



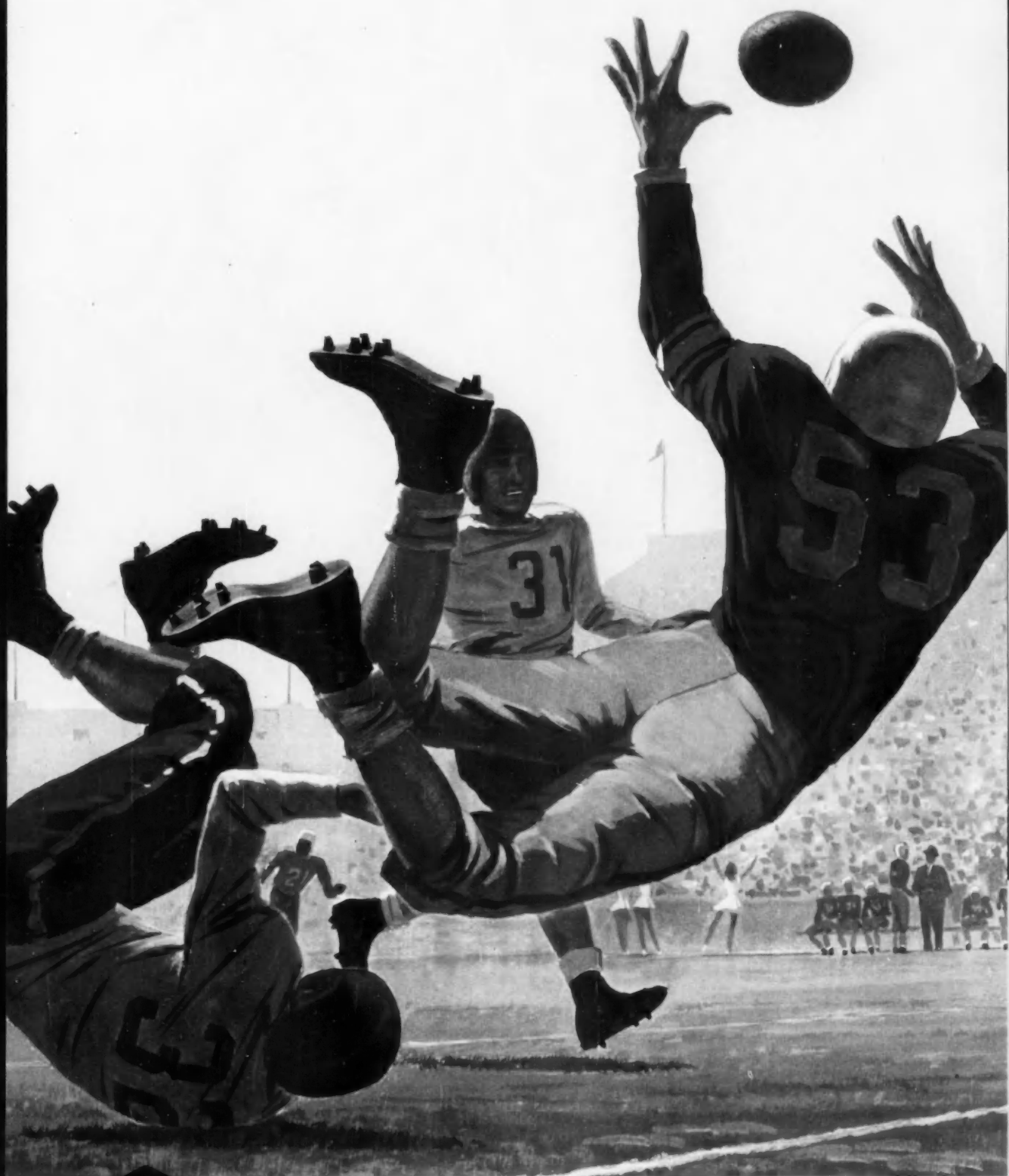
Denison 2000 psi vane-type hydraulic pump.

Circuit drawing illustrates hydraulic system for powering Caterpillar's new No. 9 Ripper.

HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

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You have to stay on your feet . . .
If you want to carry the ball



For 53 years, the Spicer Universal Joint has stayed on its feet, continuously and uninterruptedly . . . each year carrying the ball to new goals of efficient design and dependable performance. There is nothing finer in the field . . . there is nothing quite so modern, so rugged, so universally used for every type of automotive power transmission.

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Toledo 1, Ohio

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INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

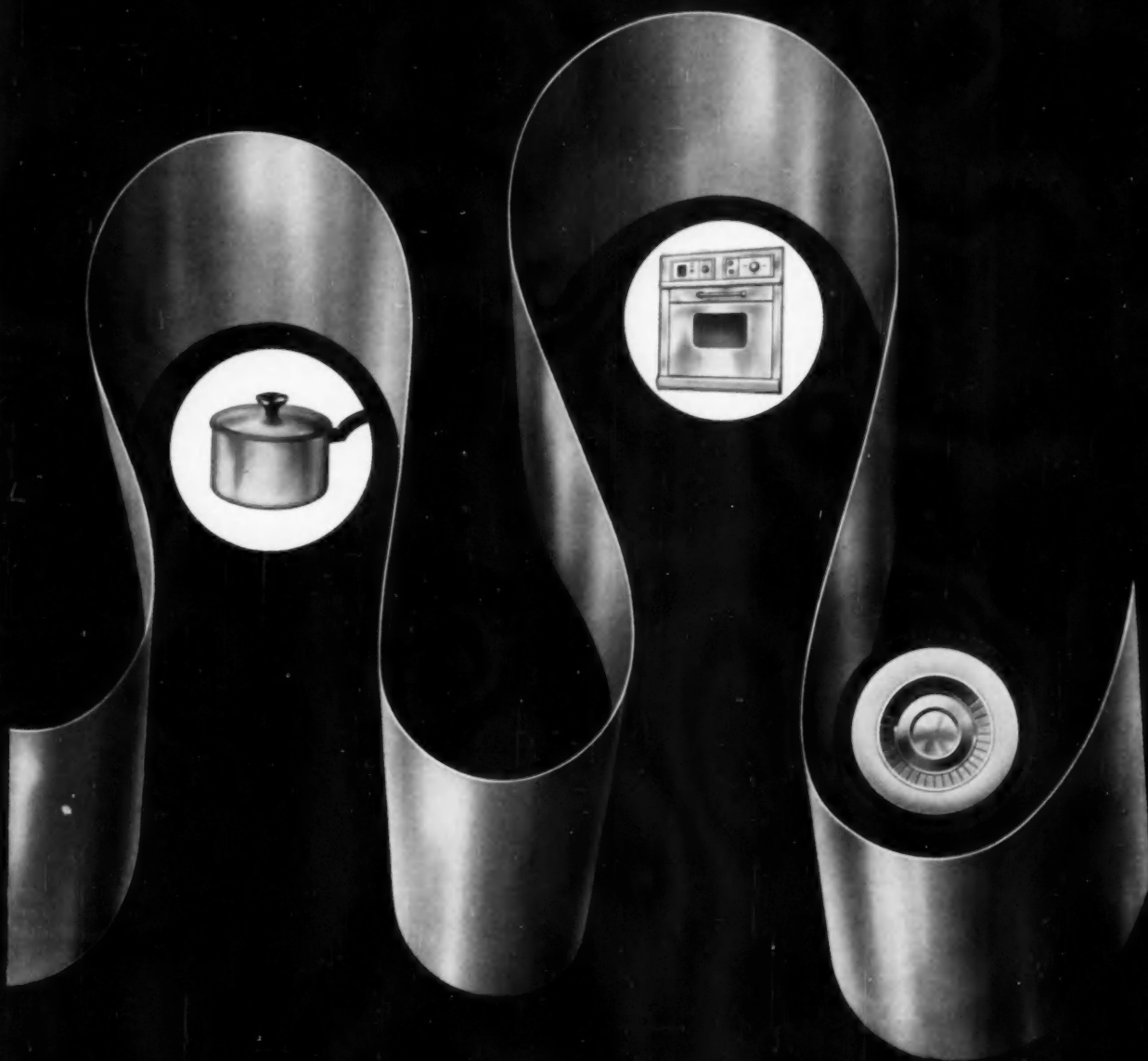
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Many of these products manufactured in Canada by
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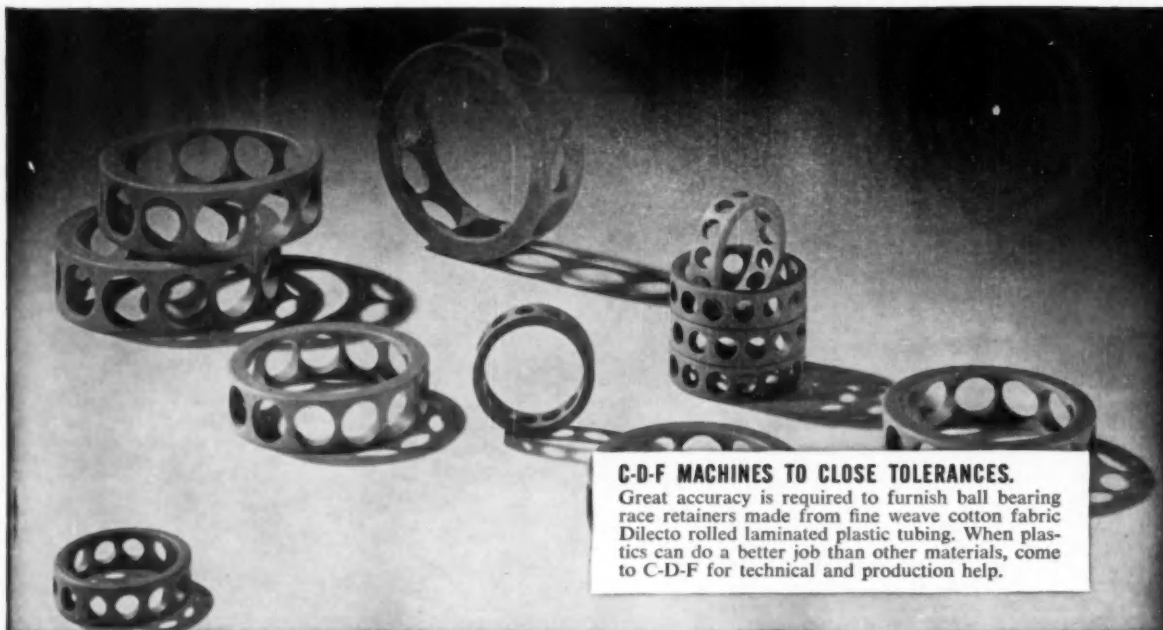
Crucible offers you precision-rolled stainless strip—in all standard grades—that is unsurpassed in uniform quality and finish. And when you buy from Crucible, you get these qualities consistently in coil after coil, no matter how many you order. »»» Remember: Crucible's operations are fully integrated from raw material to delivery to you—a fact that assures you of high quality and prompt, dependable service. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE

first name in special purpose steels

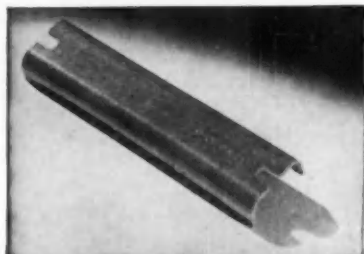
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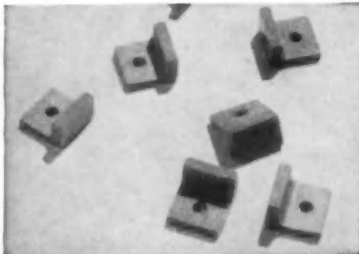


C-D-F MACHINES TO CLOSE TOLERANCES.

Great accuracy is required to furnish ball bearing race retainers made from fine weave cotton fabric Dilecto rolled laminated plastic tubing. When plastics can do a better job than other materials, come to C-D-F for technical and production help.



C-D-F PIONEERED IN POST-FORMING of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-forming.

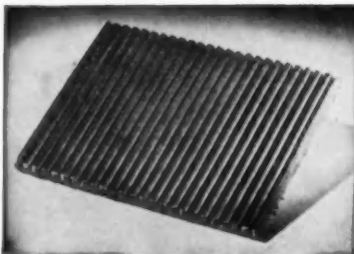


C-D-F DOES THE UNUSUAL. These rubbing blocks are made from fine-weave cotton cloth Dilecto molded tubing that has been pierced and cut. The part gains in mechanical strength — the product gets longer service life.

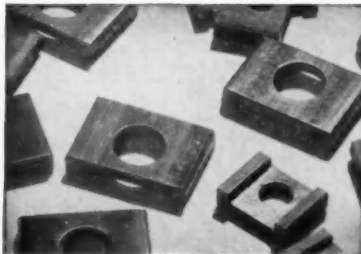


C-D-F SPECIALIZES IN AUTOMATIC SCREW MACHINING of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

Yes, C-D-F is a big reliable source for fabricated plastics!



C-D-F SERVES MANY INDUSTRIES with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.



C-D-F IS A PUNCHING SPECIALIST on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.



C-D-F COMES UP WITH THE ANSWERS to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.

See our general catalog in Sweet's Design File for more technical data, the address and telephone number of your nearest C-D-F sales engineer. Also, write for detailed information, samples, or send us your print for quotation.



CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE *Burdick* COMPANY • NEWARK 2, DEL.

New Test Facility Simulates Flight Through Thermal Barrier

(Continued from page 148)

in., 1000-watt, 240-volt nominal rating lamp, 2500-watt, 480-volt and 5000-watt, 960-volt lamps are available. These lamps have an extremely rapid warm-up time.

Induction heating equipment can be used as the heating source. Actually, surface heating with power inputs of 150 to 750 kw per sq ft are possible with rf induction heating equipment.

Ignitron Control

The ignitron unit is designed to control the effective heating voltage impressed across a fast-response, variable-resistance load. This unit is an economical method of controlling the amount of heat delivered to missiles and aircraft. It provides these advantages:

1. Rapid response and a broad range of power control for a large number of infrared lamps.
2. Maximum safety of operation of equipment which is applied under conditions conducive to accidents to personnel and apparatus.
3. The ignitron unit is either manually controlled or used with the automatic regulator control. Sufficient gain is provided making the ignitron unit applicable to other types of regulating controls which may be developed.
4. Physically, the equipment is built as an independent cubicle which is easily and quickly moved from one location to another with only a reconnection of the incoming power line.
5. Power control characteristics are insensitive to the change in resistance of a load of lamps with change in temperature of the filament, or change in the number of lamps.

(Turn to page 156, please)



Everybody knows that

SEMS BY Everlock®

End Fastening Problems for Good!

Appearance and quality are vitally important to consumer acceptance of any appliance. So is the durability with which the mechanical components are fastened together.

Sems by Everlock literally help your products to "take a better grip on themselves" and provide greater resistance to loosening through vibration, shock and heaviest use.

Sems by Everlock firmly grip both the fastener and the product with full chisel edge locking action... an Everlock exclusive... bulldog bite actually *tightens* when subject to vibration.

SEMS by Everlock Save Time and Money 5 Ways...

1. **Cut Costs** by eliminating separate handling of screw and washer.
2. **Simplify Ordering** by reducing the number of items in your plant inventory.
3. **Eliminate Waste** due to lost or dropped lock washers.
4. **Eliminate Rejects** due to omitted lock washers or faulty fastening.
5. **Fast Delivery** on a wide range of types and finishes.

SEMS by EVERLOCK

Exclusive Everlock Chisel Edges firmly grip both the fastener and the product!

Everlock Sems are available in a wide range of types and sizes. Ordering "Sems" is not enough, only Everlock Sems have the exclusive, full chisel edge-locking action.

Other Everlock fasteners that feature the exclusive full chisel edge-locking action include:
Free Lock Washers, Locknuts and Terminals.

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Another **AmF** Product

Everlock
INDUSTRIAL FASTENERS

MIDLAND

WELDING NUTS



**take seconds to apply...
save hours of labor!**

If you make a component part of an ultimate metal assembling operation requiring bolting in hard-to-get-at places, Midland Welding Nuts may well be the answer to simple, secure fastening later on. The practical Midland method anchors the nut in the exact location, ready to receive the bolt. There's no guesswork and cross-threading becomes impossible.

It's easy to apply Midland Welding Nuts.

Just insert the collar in the hole for bolt or screw, resistance-weld the nut in place, and the nut is anchored for the life of the job. Nuts can be automatically fed to the welder to save time.

Midland Welding Nuts assure close fit of metal parts. They can't work loose, causing annoying rattles. Also, parts can be removed easily and quickly for replacement or repair without threat of losing nuts. Assembly workers prefer them because they turn stubborn, difficult jobs into simple, easy to handle projects, often converting two-man tasks into one-man operations.

Write or phone for complete information!

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AUTOMOBILE and TRUCK FRAMES •

AIR and VACUUM POWER BRAKES

AIR and ELECTRO-PNEUMATIC DOOR CONTROLS

New Test Facility

(Continued from page 155)

Two inverse-parallel ignitron tubes are connected in series with the load and act as valves to control the amount of power delivered. The cathode of one is connected to the anode of the other. The resultant output is an alternating current. The point in the cycle at which the thyatron energizes the ignitron tube determines the magnitude of the power delivered to the lamp, and thus the heating effect.

Each cubicle contains three channels whose outputs can be independently controlled. Three-phase power is used by each three-channel cabinet. The independent channel takes power from one phase only and delivers it to a single-phase load.

Ignitron control channels now operating are capable of carrying 800 amp for five minutes. This current rating holds regardless of voltage. Thus, at 460 volts each channel delivers 360 kw. This corresponds to approximately 120 T-3-1000 CL radiant lamps connected to a 460-volt channel. In addition, each channel operates adequately with one lamp connected to a channel.

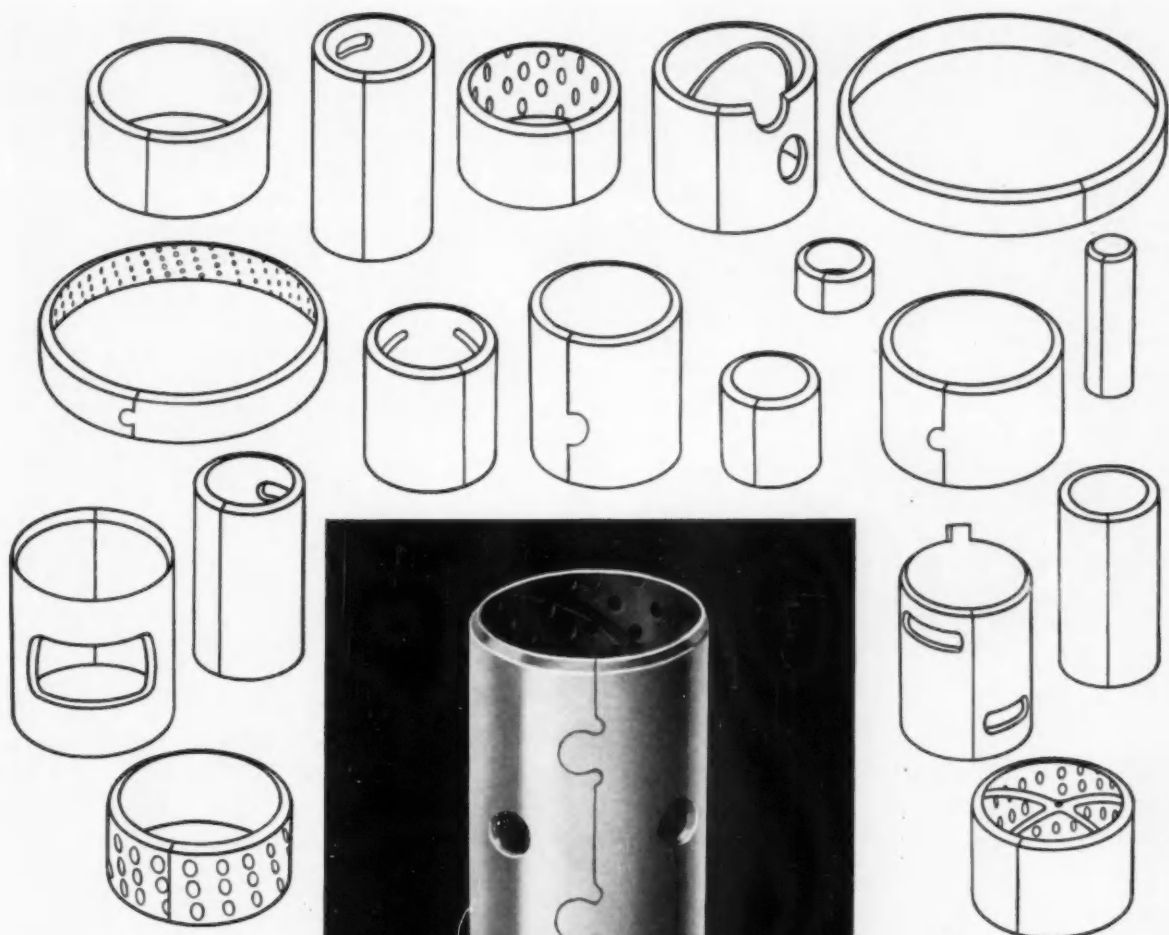
This equipment has an extremely high short-time overload capacity. Current ratings of 3000, 1600 and 1200 amp at 3, 15 and 25 seconds respectively are achieved. Each short-time rating can be followed by a continuous rating of 300 amp.

The response of the power control is rapid. For a change in control voltage the effective output voltage squared (heating effect into a constant resistance load) attains 63 per cent of its final value in 0.02 seconds.

Temperature Recorder

A high-speed temperature recorder transcribes the temperatures of the control zones of the aircraft or missile under test. At present, the temperature recorder is calibrated for thermocouples in a temperature range from minus 350 F° to plus 2650 F°. Chromel-alumel thermocouples used with this equipment are provided in

(Turn to page 158, please)



Solid bronze, steel or aluminum

Steel lined with bronze, babbit or copper alloy

Plain or ball indented

Oil holes, grooves, slots, notches as required

Straight, clinch butt or special seams

Many lengths and diameters

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are established through controlled alloy quality and grain structure. Our method of manufacture also permits wide flexibility in design features. Complete engineering service. For details, address:



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three ranges: minus 350 to 650 F. zero to 1000 F and minus 350 to 2650 F. The temperature sensing and recording equipment incorporate special features developed by Westinghouse and the Bristol Co., to eliminate the high stray fields induced by the rapid power changes and unusual power wave form from the ignitron units.

Future tests will require surface temperatures of 5000 F and above. Exclusive of the temperature recorder, the elevated tem-

perature test facility operates reliably in the higher temperature range.

Regulator Control (Computer)

The regulator develops the control signal used to modulate the ignitron controller. This unit develops the signal either to regulate to a given time-temperature schedule required of the aircraft, or to a given power required signal as developed by arbitrary aerodynamic input functions func-

tions and surface temperature measurement.

The power control responds to a signal which is proportional to the error between the power desired to be transferred and the actual power transferred. Since no satisfactory heat transfer measuring equipment is known, two approximations are used.

One method takes the product of the voltage and current to obtain the power to the lamps. The efficiency of transfer of energy from the lamps to the aircraft is then calculated. Thus, the product of efficiency, voltage and current gives the energy into the test floor aircraft.

The second method considers the heat per unit time into the aircraft as proportional to the derivative of the skin temperature. A signal proportional to the power into the aircraft is obtained. The command signal, showing the power into the aircraft required to simulate a given flight trajectory, is developed by the computer. Using an injected coefficient of heat transfer and the effective temperature of compressed air, and the measured value of the skin temperature of the vehicle, the computer instantaneously calculates a regulating signal. This calculated signal is the power which is desired to inject into the aircraft to simulate the flight condition which would occur.

This regulator has exclusive compensating network refinements of operating features specifically developed for this application by Westinghouse, Berkley Division of Beckman Instrument Inc., and Alabama Automation Corp.

Plug-in Bus Duct

The ventilated bus duct system consists of low-voltage drop plug-in busway using aluminum bus bars. The receptacles for plug-in devices are equipped with barriers to prevent live parts from being accessible at any time during installation or removal. Circuit breaker plug-ins prevent removal from the receptacle until the breaker is in the off position.

The bus duct requires a minimum of field measurements and installation time. Fittings are in-



**GOSHEN
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*of proven synthetic and
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*to meet today's toughest
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See our catalog in Sweet's
product Design File.



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the world's only

TOTALLY-PROTECTED MOTOR

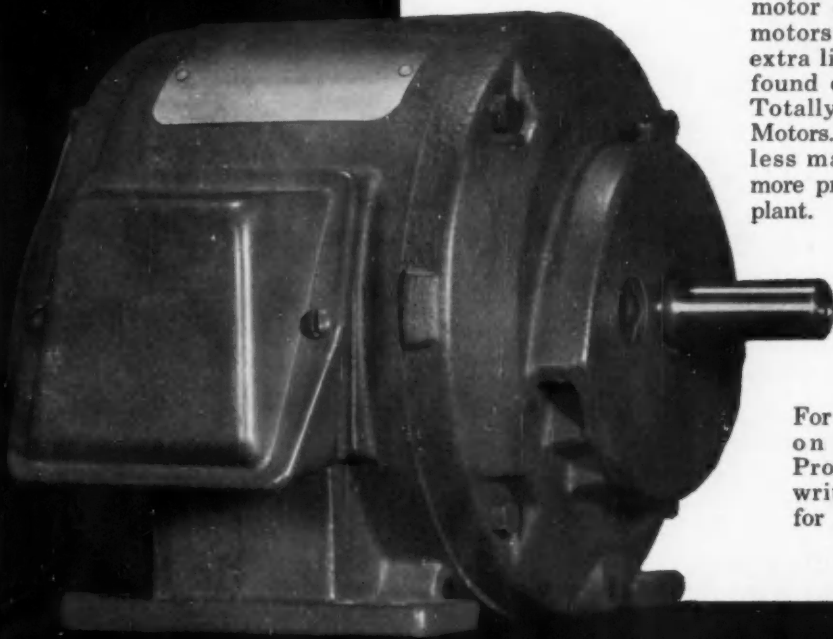
When we speak of Totally-Protected, we mean superior frame design with rigidity for heavy load conditions. We mean Metermatic bearing lubrication, acid and oil-proof insulation system, and motor leads, labeled and sealed in neoprene.

Totally-Protected means all this and more, but most of all it means a new concept of motor design and construction.

This Totally-Protected concept brings you a new motor efficiency. These motors have a built-in extra life—an extra life found only in Reliance Totally-Protected A-c. Motors. You profit from less maintenance and more production in your plant.

For more information on this Totally-Protected concept, write to Dept. 510A for Bulletin B-2401.

(B-1543)

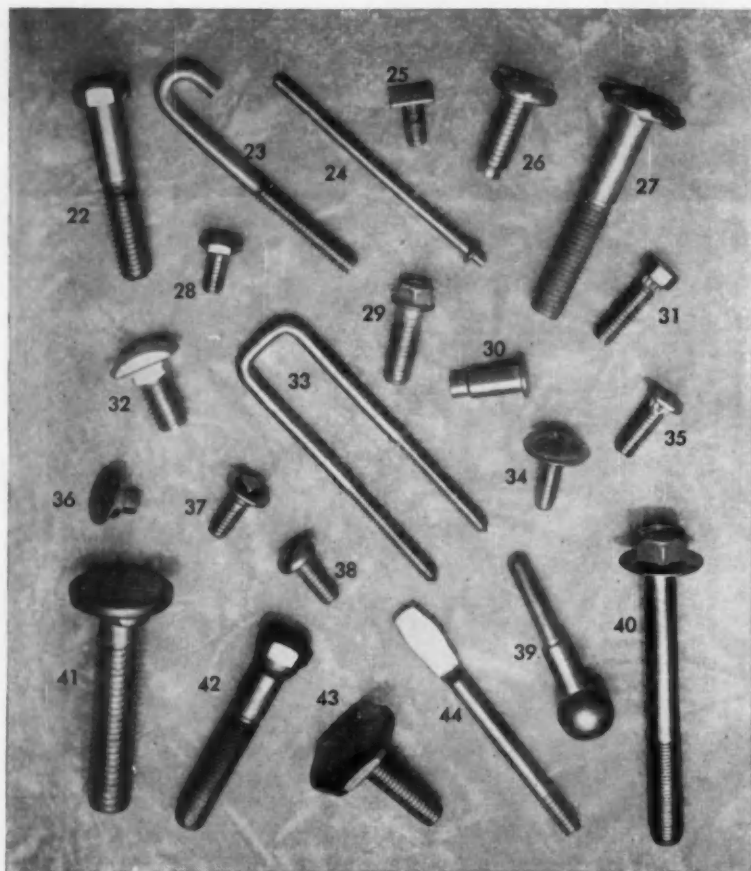


RELIANCE **R** ELECTRIC

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Many **GOOD** products
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terchangeable and reusable. To provide for future additions or alterations, standard flexible fittings are available.

Safety Features

A thermal overload relay coordinated with the long thermal characteristics of the contactor and bus work, and an induction disc overload relay coordinated with the short-time characteristics of the ignitron tubes, permit full use of the equipment capacity. Both of these relays are arranged to trip the line contactor in case of equipment overload. Under these circumstances only one control channel is lost during a test run. Since the shutdown is restricted to a small number of lamps, maximum test data are obtained.

In case of short circuit, the induction disc overload relay trips the ignitron feeder breaker. This short-circuit trip setting is fixed below the setting for the transformer breaker. For this reason, the feeder breaker trips off a small portion of the control circuits avoiding possible loss of all control channels. The flow of test data is uninterrupted.

The equipment is suited for ease in maintenance. All electrical equipment is completely enclosed in a metal cabinet. Where applicable, the electronic equipment consists of plug-in type units. This construction permits replacement of faulty components rapidly.

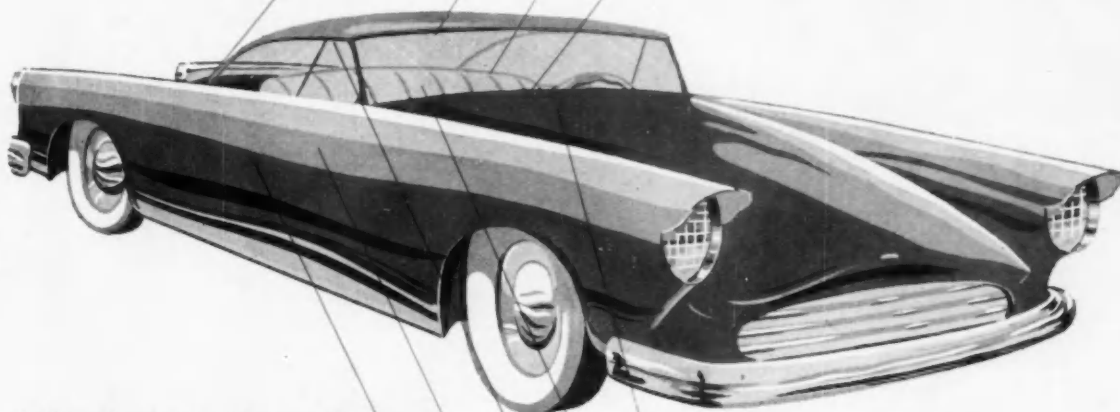
Power for each channel is supplied by its own individual control transformer. No second source of power in any control channel section can cause personnel hazard while work is being done in an ignition control cubicle.

Other safety features include extensive interlocking. For instance, door interlocks are provided to trip appropriate power supply controls when the door is opened. The door interlocks are connected with the channel "on-off" push buttons located on the master control console. Therefore, the line contactors can never be energized from the master control console when the doors are open.

Orders for the new test unit

*for New Ideas in
safety, comfort and
simplified production*

Investigate URETHANES!



Urethane foams now make cars safer!

Soon, they may also be widely used to make cars more comfortable . . . to keep out heat and cold . . . to deaden road noise . . . and to add new notes of interior luxury. Made with National Nacconates®, urethane foams are easy and economical to use. They can be cut and sewn, tacked, die-cut, sawed, molded to required shapes . . . or foamed in place. They are readily bonded to or sandwiched between fabrics, plastics or other construction materials.

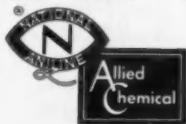
Additionally, urethane rigid foams and urethane coatings have exciting possibilities in trucks, trailers and other automotive applications.

For additional information, write National Aniline describing as fully as possible your potential use.

We do not make urethanes but are a major producer of NACCONATES (Diisocyanates), basic component of all urethane formulations.

**NATIONAL ANILINE DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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Portland, Ore. Providence Richmond San Francisco Toronto



Foamed-in-place "cushioned trunk lining" to protect luggage can add a new sales point.

Sun visors are also padded. Urethane headlining insulates against sun and cold while thicker foam up forward gives added safety-pad protection.

Rear-seat passengers are protected with safety-padding behind front seat. Low cost and light weight encourage generous use of urethanes.

Safety-padded dash has optimum resilience, absorbs shock without dangerous "bounce-back".

Rigid foam can be used to insulate against motor heat and to water-seal wiring and cables.

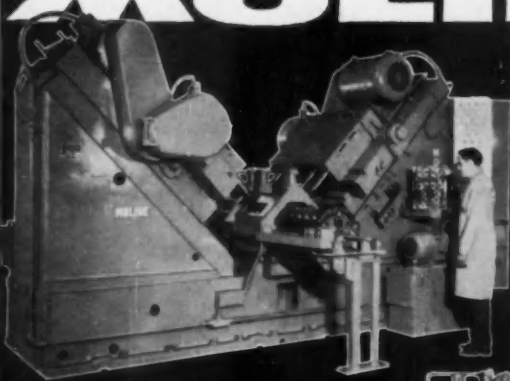
Controlled resilience gives the proper degree of buoyancy so urethanes can be used in seat cushions.

Urethane door-seals and weather-stripping around windows resist deterioration.

Arm rests are easily made by foaming urethane to the supporting insert and the outer covering in one simultaneous operation.

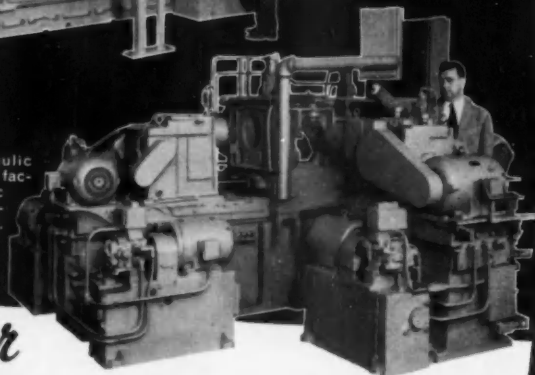
Luxurious "sculptured" door panels can be made by foaming urethane to the outer coverings in an embossed mold.

MOLINE



No. 13CB V-type cylinder boring unit is used either as an individual machine or as one of several automated units in a transfer line for boring automotive engine cylinders.

MR138 four-way, hydraulic feed, drilling, boring and facing machine with hydraulic clamping fixture for tractor main frame housings.

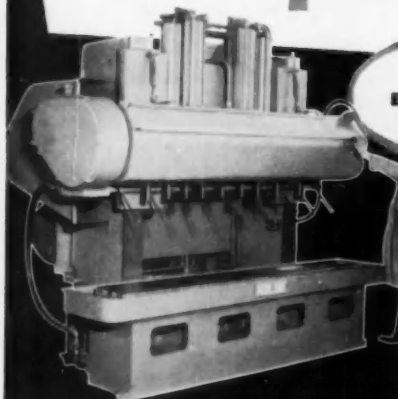


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- Special Multiple Operation Machine Tools



HD67 hydraulic rail feed, straight-line type, multi-spindle drilling machine. Six-foot rail length as shown; also available in eight and ten-foot lengths.



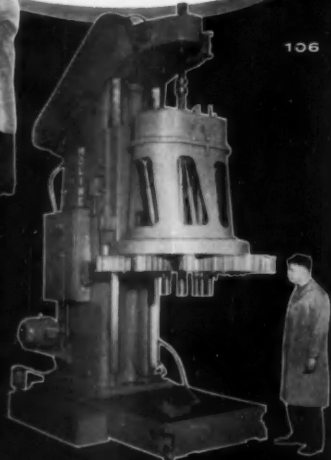
No. 116-U hydraulic rail feed, universal joint type driller with 16 two-speed and neutral top drivers plus four-speed quick, change gear box. Spindles illustrated are 1 1/2" drill capacity each in mild steel.

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have already been placed by the Martin Co., Convair Division of General Dynamics Corp., Bell Aircraft Co., and Chrysler Corp. Missiles Operations Division in Warren, Ohio.

The Martin Company facility, to be installed at Denver, Colo., will be used for structural testing purposes on Project Titan, one of the nation's large-scale intercontinental ballistics missile programs and the Chrysler installation is slated for testing operations on two intermediate range ballistics missiles, the Jupiter and Redstone. The Bell Aircraft test facility will be installed in the new Lawrence D. Bell research center at Buffalo, and the Convair test unit will be installed at the company's San Diego, Calif., divisions.

• • •

GM Offers 4-Year Scholarships To 400 High School Students

General Motors is offering four-year college scholarships for more than 400 high school students in the United States and possessions as part of the GM \$5 million a year program of aid to education. Already, some 1200 students are attending college under the program, initiated two years ago.

The grants range from \$200 to \$2000 a year per student, depending on need, and the average award during the first two years was \$949 annually. Of the students already in school, about 70 per cent plan careers in engineering and science, according to GM.

AC Spark Plug Ends Run On Bomb and Gun Sights

AC Spark Plug has ended production of bombing navigational computers and gun-bomb-rocket sights at the Milwaukee plant, and the facilities now are being used for missile contracts. AC began building sights and computers in 1948 and completed more than 12,000 units valued at \$415 million in the nine-year period.

Houdaille Will Build Plant For New Canadian Subsidiary

Houdaille Industries, Inc., will build a \$2.5 million factory at Toronto for the company's new subsidiary, Strip-pit Tool & Machine, Ltd. The Canadian firm will make punches, dies and other sheet metal fabrication equipment.

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Machine features include: (1) Robbins panel, one-third standard size, with plug-in aircraft type relays and controls which prevent assembly unless parts are correctly positioned, (2) Index table with both barrel type cam and shot bolt for accuracy and magnetic operation of index and dwell, (3) Positive dwell time control through synchronous timer and electrical interlock at each station, (4) Hardened and ground ways, (5) Automatic lubrication, (6) Electrical and pneumatic equipment to J.I.C.

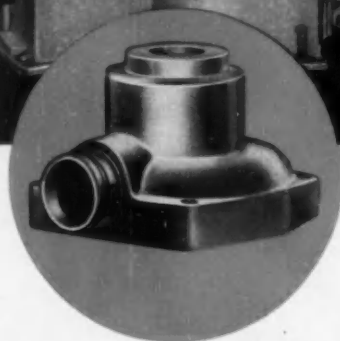
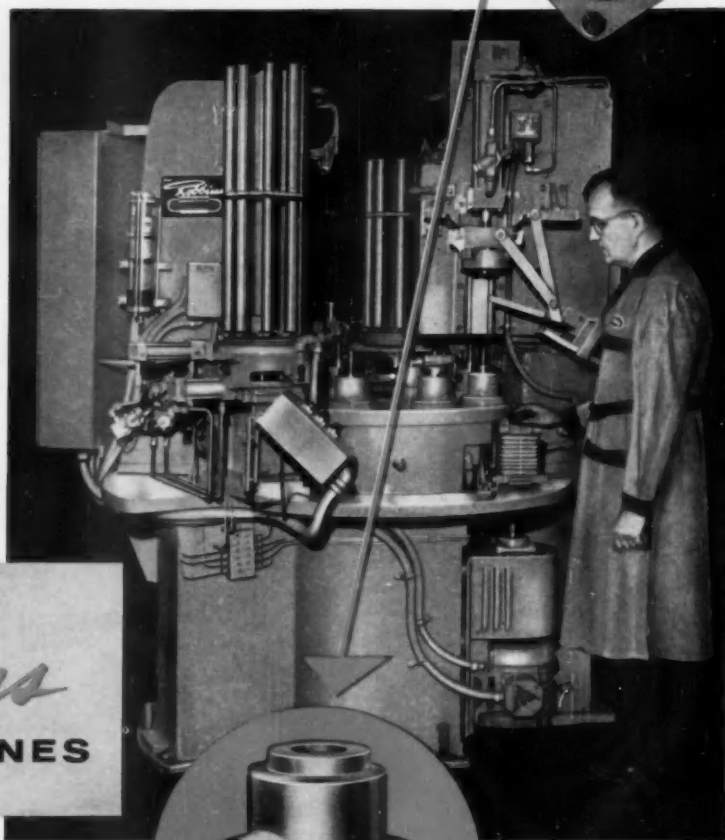
Robbins special assembly machines save manpower, speed production and improve quality, often combine machining with assembly for further savings. Automatic inspection, selection, orientation, assembly and in-process gaging assure consistent high quality production. Ask us for recommendations to help solve your automatic assembly or machining problem.

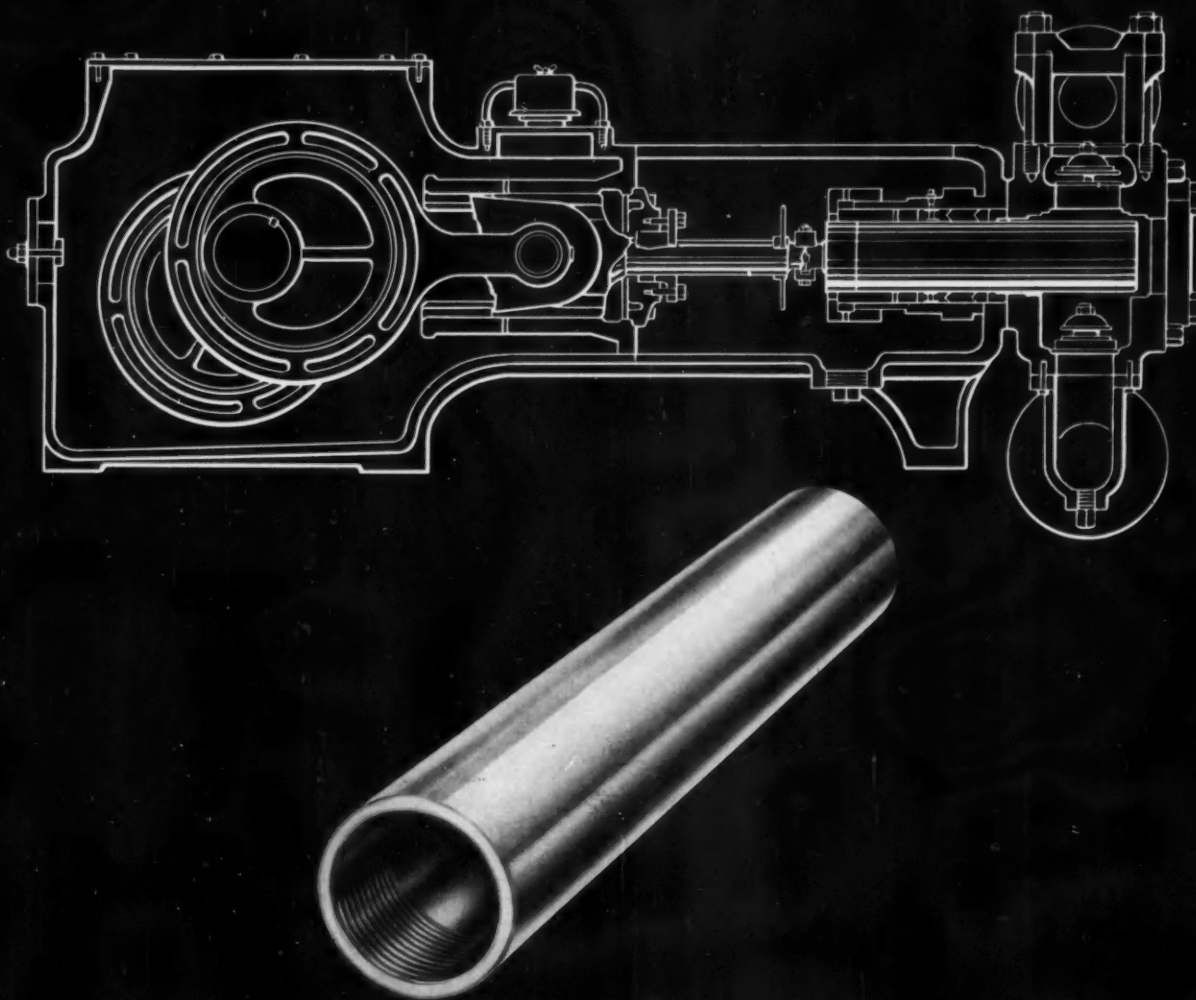
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Reducing Costs With Job Matched Tubing

Does a higher grade tube really cost more? Reduced overall manufacturing cost of pump plungers resulted when one maker switched from tubing made from open hearth processed alloy steel to B&W electric-furnace Alloy Steel Tubing. Rejections on a large production run were reduced drastically (10.75% to 1.25%).

The plunger had to have a very good finish and was to be chrome plated. Jobs like this require high quality and "clean" steel. Because of B&W's melting practices and familiarity with making "clean" steels for bearings and other applications, it was suggested to the fabricator that he consider B&W electric-furnace 8620 Steel Tubing. The use of B&W electric-furnace Alloy Steel drastically reduced rejects on the finished part.

Once again Mr. Tubes proved conclusively that final cost—not initial cost—is the measure of good tube fabricating practice. If you're concerned with costs as well as producing a good finished product, get in touch with Mr. Tubes. He can help you save money. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-6100-M5

Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels.

New Developments Disclosed at Technical Activities Seminar

By Joseph Geschelin

ABOUT 1400 production specialists, representing major automotive plants as well as plants in other metalworking industries, together with a group of editors of metalworking publications, partici-

pated in two-day meetings of the Technical Activities Seminar as guests of The Cincinnati Milling Machine Co.

The Technical Activities Seminar (TAS) is a noteworthy new

venture at The Mill. The sessions held during the first two weeks of this month were concerned with some of the most outstanding developments in the art, stemming from the company's research department activities.

Although the program was replete with mechanical developments of vital importance to automotive plants, it was interesting to find that one relatively simple discovery overshadowed the other major developments that hold so much promise of advancing the art of metal cutting. We refer to research work leading to the discovery of the spiral drill point.

Introduced by Dr. Hans Ernst, the concept of the spiral drill point was characterized as the first basic change in drill point configuration since the machine-made twist drill made its appearance in 1860. From time immemorial the drill point has had a chisel edge. The spiral drill point has many important advantages, including the following: it is self-centering, hence does not require special arrangements to assure centering; it produces round holes; and the holes have a better finish, free from burrs. What is of major importance in any plant, but particularly in automotive plants using large transfer machines, is that the spiral drill point will drill many more holes before grinding is necessary. Increased drill life will mean less attention to drills with a consequent improvement in usable machine time.

This development is double-barreled, it offers the spiral drill point, and at the same time it makes available a simple and surprisingly low priced machine for producing the drill point. By a minor adjustment of this machine, a modified point shape may be generated which has unique advantages in drilling sheet metal, particularly effective in aircraft airframe work. More detail on this machine will appear in a later issue.

Complete details of the Cincinnati Digi-Log numerical control system were given by a team of specialists from the Machine Tool Development Research Department. It is characterized as a relatively simple system based

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Years of engineering mastery, manufacturing experience and tough field testing have proved the unequalled quality of Tulsa Power Take-Offs. Precision-made . . . compact . . . powerful, durable and quiet . . . Tulsa Power Take-Offs are foremost with these outstanding features . . . shaved and heat-treated gears, hardened shifter yokes; anti-friction bearings throughout; strong, lightweight heat-treated aluminum housings . . . extremely low prices with nationwide distribution and service. Tulsa assures you unequalled quality in Power Take-Offs sized from single speed, medium duty to multiple speed, heavy duty models.

NEW GOLDEN BONDERITE for Aluminum

**Uniform color means uniform coatings
and uniform efficiency**

It's the simplest thing in the world to check on the efficiency of a Golden Bonderite installation. Just look at the color of the aluminum as it comes out of the Bonderite machine. The uniform golden coating looks the same—and it is the same—24 hours a day, seven days a week.

Golden Bonderite sets entirely new standards of efficiency and performance as a paint base for aluminum and its alloys. Operated with the Parker "Reactifier," the Golden Bonderite solution can be used indefinitely, ending the costly necessity of dumping the bath at frequent intervals. Normal chemical replenishment keeps the Golden Bonderite solution in continuous balance.

This ease and certainty of achieving uniformly excellent results means real savings for aluminum fabricators.

It guarantees an effective base for paint.

It breaks the finishing line production bottleneck.

It saves money on chemicals.

It saves money on rejected parts and minimizes field calls because of finish failures.

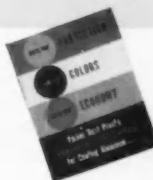
There are no limitations on the use of new Golden Bonderite. It may be applied by spray or immersion. Treatment cycles can be set to suit production speed and equipment.

Samples of Golden Bonderite-treated aluminum, plus test data, are available for your inspection. Write or call.

How Parker "Reactifier" Works

In conventional surface treatments of aluminum, work passing through the solution causes a buildup of impurities. As impurities increase, solution efficiency decreases until there's nothing to do but dump the bath and start over.

The Parker "Reactifier" removes these impurities as fast as they are formed in the Golden Bonderite solution. Constant circulation of the Golden Bonderite through the exclusive "Reactifier" means a balanced, efficient solution that can be used indefinitely.



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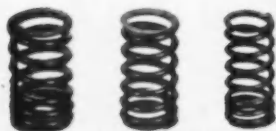
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upon the use of precision toroidal transformers in the electronic configuration. It is claimed that practically any function now controlled by an operator can be governed by numerical data. As is well known, the application of Digi-Log numerical control is a vital element in special machine tools for the aircraft and missiles fields where the special configurations would be virtually impossible of achievement without automatic control. The system offers unique advantages for precision work since it is both an accurate analog system and an absolute system. Moreover, the feedback units always give a positive and unambiguous indication of the exact position of machine elements with respect to an absolute starting point.

Another session was devoted to electro-hydraulic control systems which have been applied to a variety of Cincinnati machine tools, including: control of complete machine lines; automatic skin milling machines; remote control of machine tools; electric and photo-electric tracing machines; and the new No. 2 Spiralmatic milling machine.

The session on chipless machining was intensely interesting not only to the participants but to all metalworking establishments where such methods can be applied. This touched on the Hydrospring principle which encompasses shear spinning, tube spinning, and contour spinning. The well-known Hydroform process also was discussed, included announcement of a new press design in which the press structure is of clean cylindrical form.

Electro-Discharge machining marks another facet of metal cutting. With this technique it is a relatively simple matter to machine any metals and most carbides without regard to hardness, strength, or structure. Further progress is anticipated both in machines and tool materials in the interest of expanding the usefulness of this method.

One important session had to do with the unfolding art of ceramic tool machining. Results indicate that when properly used ceramic tools offer the possibility of increased productivity and lower

easy to form



You can form these castles in a variety of sizes and shapes. And Parish Pressed Steel Division of Dana Corporation, a leading manufacturer of automotive chassis and frames, uses A. W. Dynalloy steel for the same reason . . . easy formability!

There are other reasons, of course. A. W. Dynalloy is

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costs. Investigations in turning indicate that certain ceramic tool materials may even out-perform both cemented carbides and cermets on steel, cast iron, and many non-ferrous materials, if they are properly applied. However, this still is not true of all commercially available ceramic tool materials.

Studies of milling at high cutting speeds have shown greater tool life on cast iron and on certain non-ferrous materials such as pure nickel.

Advance studies in the field of ceramic tools were reported, indicating that strength, hardness, and chemical inertness at elevated temperatures are properties that contribute most to good performance in metal cutting. The possible future for cermets—metal-bonded ceramics—appears to offer considerable promise. The use of new types of refractory materials was also discussed.

Studies of the wear of grinding wheels show that the wear curve is similar to those of other cutting tools. Cincinnati research has developed a unique technique for accurately measuring wear in terms of "grinding ratio," the ratio of the volume of metal removed per unit volume of wheel worn away. Experimental findings indicate that grinding ratio decreases with increased metal removal rate, and increases with work diameter, decreased chip load, and increased concentration of grinding fluid. Power is increased with both removal rate and the amount of metal removal.

Fundamental research is supplying much additional information in the study of wheel wear. Experimental techniques for the study of chip formation in grinding also have proved to be of value. A "quick-stop" apparatus is used to freeze grinding action by accelerating a tiny workpiece almost instantaneously to grinding wheel speed. Another device permits comparison of the shape of the grinding grit and that of the contour of its path through the workpiece by a replicating method.

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These self-insulating "Snap Fast" connector units simply snap together, simultaneously connecting two, three, five—up to eight different electrical circuits, *instantly*, without error or indecision. Automakers using this Packard Electric idea *save more than a million dollars per year in production costs!*

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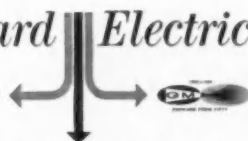
loose. They effectively eliminate assembly line fires or other damage which result from incorrect single terminal installation.

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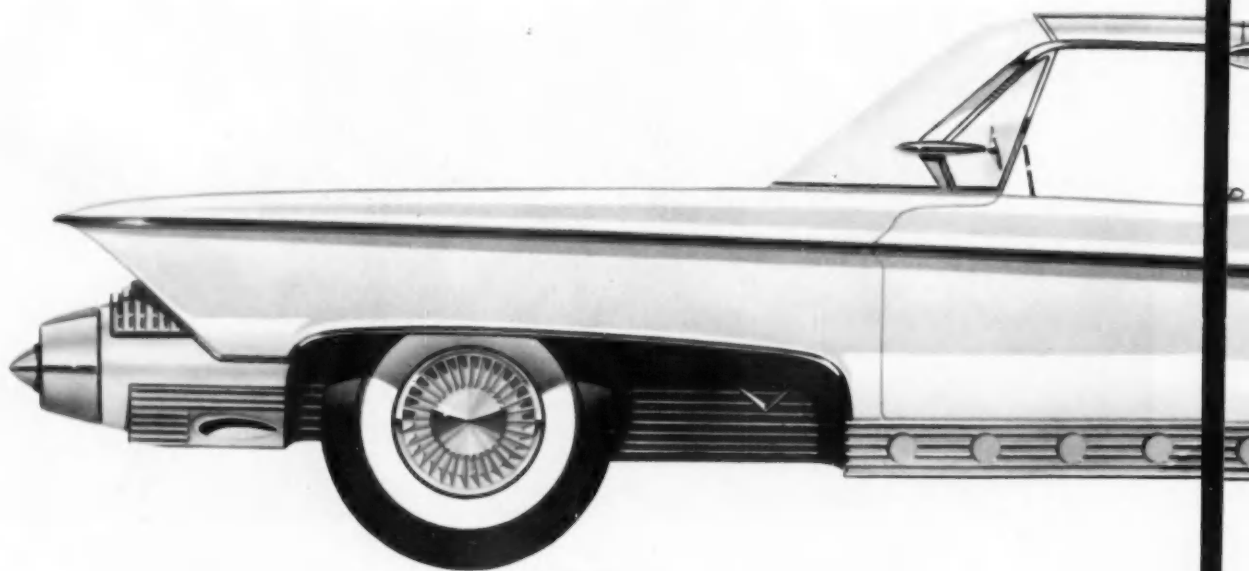
Packard Electric

Warren, Ohio



"Live Wire" division of General Motors

Exterior: The Piedmont side view presents bold, straight-through styling in aluminum! Bright, full-length rub strip is integral with the stamped aluminum body panels and one-piece cast aluminum door. Anodized finish assures permanent beauty without painting. Ribbed lower side trim is exposed portion of cast aluminum frame. Wheel wells are ridged aluminum stampings; colored vinyl fills hollows between ridges. Decorative finned casting behind front bumper is aluminum exhaust muffler. Bumpers are cast and extruded aluminum. Retractable hardtop of aluminum sheet, forgings and castings folds to half its length, disappears into rear deck. Roll-away deck cover of aluminum extrusions and neoprene joining strips leaves opening unobstructed.

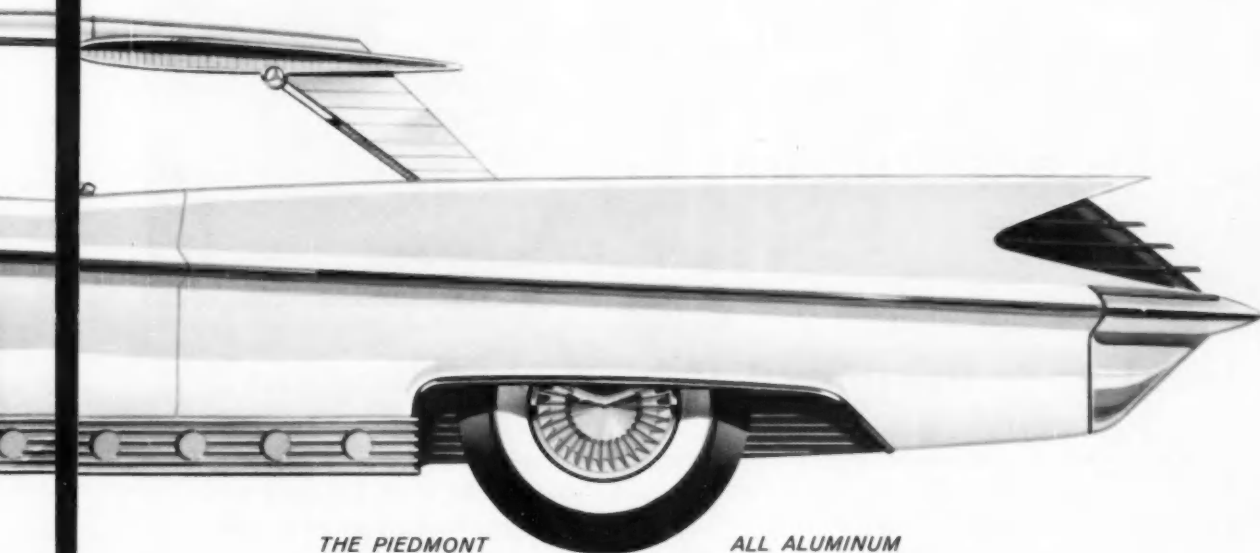
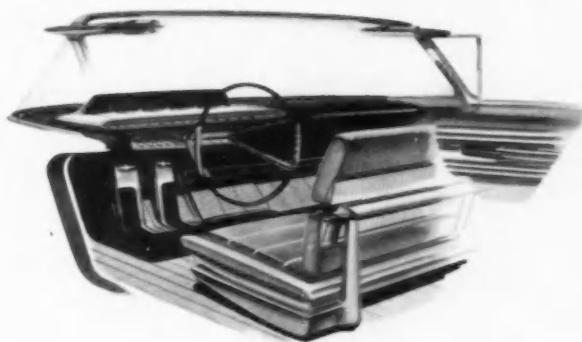


A KAISER ALUMINUM DESIGN

This Kaiser Aluminum design represents a concept of a car for the immediate future. Its purpose is to suggest aluminum's versatility . . . aluminum's infinite range of automotive design possibilities. The applications shown are logical, within the realm of present possibility.

Kaiser Aluminum will be pleased to work with you as your "idea partner" for further development of ideas suggested by this design.

Interior: The Piedmont's interior presents an inspiration for experiment from firewall to seat back! Firewall, toe-board and panel parts are integrated into a single aluminum casting. This casting also includes heater-ventilator grilles and all necessary bosses and studs (for easy assembly). Speedometer numerals are cast into instrument cluster housing. Floorboards feature cast-in texture and pattern to eliminate need for carpeting, and all corners can be full-rounded to simplify sweeping and cleaning. Inner door panel shows another example of cast-in texture and trim with permanent anodized color. Seat frame of forged aluminum permits very light construction with sculptured styling. For the pivoted backrest, the seat back may be stamped, cast or extruded of aluminum, with unlimited variations of formed-in texture available for decorative trim.



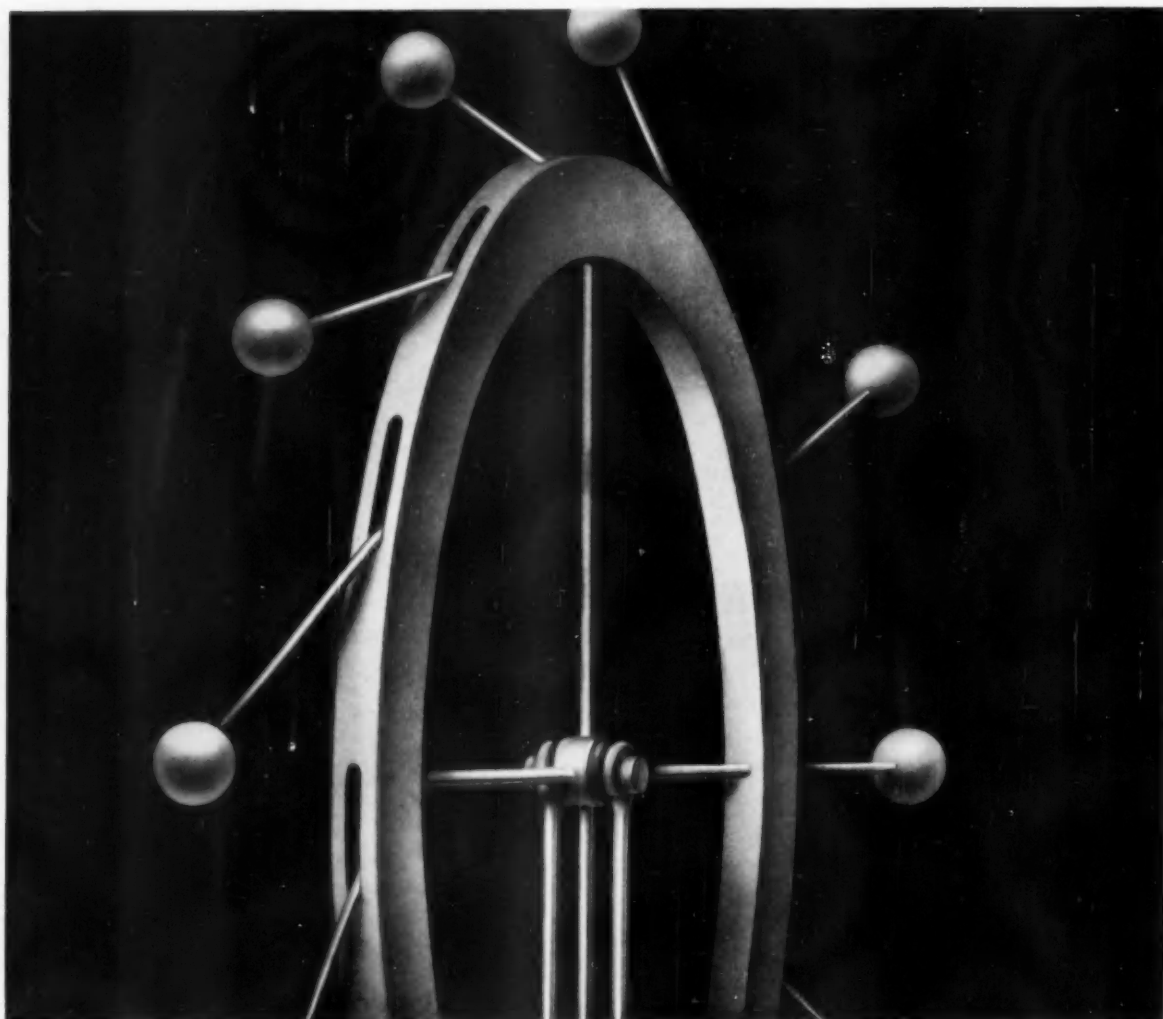
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What Price Executives?

(Continued from page 102)

1956. On the average chief executives received 5 per cent more compensation than they did in 1955. Since 1955 was a banner year by any measure, this increase is good compensation progress. Actually, only about 50 per cent of the executives received an increase. About a quarter took a cut in compensation; rest stayed the same.

The automotive parts industry chief executives in total did not do as well. In total, compensation dipped 1.1 per cent for chief executives. But actually, over 45 per cent of the executives received compensation increases. Slightly less than a third experienced no change in compensation and a somewhat smaller number took a pay cut—a higher percentage in the latter instance than for industry in general.

It is interesting to study this against the backdrop of sales and profits for the industry. Industry sales for the parts manufacturers increased 2.8 per cent over 1955. About half the companies in the survey for the industry registered gains while the other half lost ground. Slightly less than half showed profit gains although the industry as a whole fell off 6.8 per cent. Most of the chief executives receiving pay boosts were in those companies showing profit increases although not in every case. A handful of executives received pay increases although profits did not increase. But in every instance of an executive receiving a pay cut, there was a corollary drop in profit performance. On balance, the relationship between profit performance of the company and compensation results seems well supported.

In reviewing parts industry performance as a whole, it was significant to note that most of the companies showing profit and compensation increases were not as dependent on the vehicle manufacturers for business as those that suffered declines. Since the major vehicle manufacturers generally

(Turn to page 176, please)



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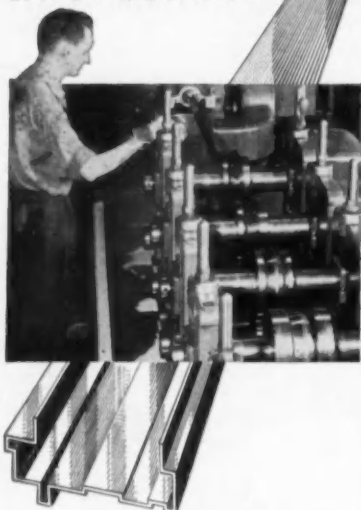
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If you are in the business of manufacturing a product that is, or could be, made wholly or partly from flat rolled metals in thicknesses up to $\frac{1}{2}$ ", a Yoder Roll-Forming machine can help reduce your production costs.

Cold-formed shapes of every description—including structurals, tubular products, moldings, trim, roofing and siding, panels, cabinet shells, etc., can be produced on Yoder cold-roll forming equipment at the rate of 25,000 to 50,000 feet per day at a conversion cost of only a fraction of a penny per foot! With speeds and costs such as this, even part-time operation of a Yoder roll-forming line is a profitable investment!

Additional operations such as welding, coiling, ring forming, perforating, notching, embossing or cutting to length can be simultaneously introduced to the basic shape at little or no additional labor cost. Yoder engineers are at your service in explaining the advantages of roll-forming for your individual needs.

A new, revised, Fifth Edition of the Yoder Cold-Roll Forming book is just off the press. In addition to economic and mechanical possibilities of cold-roll forming, it contains numerous illustrations of end uses and applications of roll-formed shapes. Write for your copy today.

THE YODER COMPANY
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showed a decrease in sales and profits, 1956 over 1955, those companies engaged chiefly in supplying them seemed to have been similar victims of the unit drop in vehicle output of some 18 per cent.

The Penalty Aspect

It is interesting to note, however, that the penalty aspect seems less severe than might be expected. Fifty per cent of the companies showed a percentage decrease in profits, 1956 over 1955. Yet more than half the chief executives in these companies experienced no change in their compensation.

A number did receive pay cuts, but the penalty impact was not as widespread as the reward influence for the number of executives in the companies reporting profit gains. A curious finding stems from the nature of the pay cuts experienced by second-line executives in those companies where decreases occurred. In a number of cases, these executives experienced greater percentage decreases in compensation than the chief executives. In any

case, the second-line executives fared less well relative to the chief executive than they did in 1955 as the table below shows while the third and fourth highest paid executives maintained the same relationship.

	Percent of Chief Executives' Compensation	
	1955	1956
Second highest paid executive	73%	67%
Third highest paid executive	57	57
Fourth highest paid executive	54	54

1956 for Industry as a Whole

Industry as a whole showed a continued rise in sales profits and compensation of the chief executive in 1956. While the year was not as spectacular, on balance, as 1955, the fact that increases were gained at all over such a banner year is an encouraging index to the economy. The accompanying table indicates the detail for 18 industries.

It will be noted that the automotive industry ranks well below

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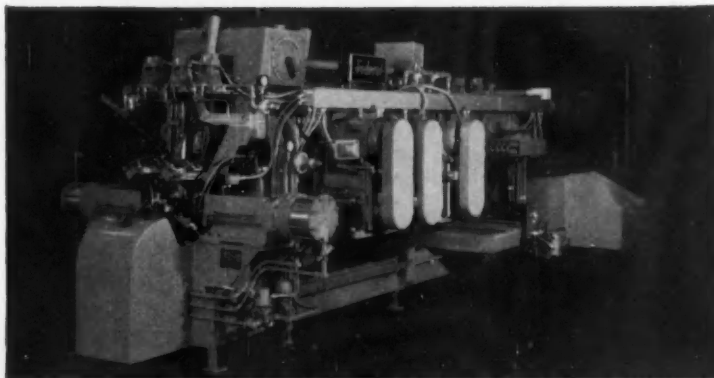
one-source production lines spark interest of volume producers...

The prospect of ordering an entire production line, ready made to produce a part to specification, has arrested the interest of many of the nation's top production engineers.

One source responsibility assuring better service; a line 100% harmonic, all stations engineered to work in perfect synchronization; integrated and automated handling of work in process; utilization of common drives and bases, reducing operating costs and floor area, are some of the advantages of the packaged line that has production people talking.

Federal/Warco pioneered the packaged line and have already produced automated lines combining such operations as blanking, forming, drawing, welding, machining, drilling, assembling on a common base.

For additional information contact the Federal/Warco representative nearest you or write direct.



This Federal Packaged Production line welds, spot faces, reams, de-burrs, sets six bolts and welds them in place . . . ejecting finished pedal brackets at a rate of 775 pieces per hour.

Federal / Warco
PACKAGED
PRODUCTION LINES

THE FEDERAL MACHINE AND WELDER COMPANY - WARREN, OHIO
AFFILIATED WITH BERKELEY-DAVIS, INC., DANVILLE, ILLINOIS, MANUFACTURERS OF AUTOMATIC ARC WELDING EQUIPMENT.



**YOU CAN
SAVE TIME,
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AND COSTS
with**

Formed Tubes...

★ Save Time

We have a huge stock of dies and, when needed, tooling's fast. We also avoid delays by making our own electrically welded steel tubing, sizes from $\frac{3}{8}$ " to 3" OD.

★ Save Trouble

Long, active experience with all tube forming processes and high standards of quality control make sure your orders will be completed *right*.

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It's routine for formed tubes parts to deliver top performance, save weight, cut costs. Steel, copper, brass, aluminum or stainless tubing fabricated in $\frac{3}{8}$ " OD to 6" OD sizes; from 20 to 11 ga. metal.

Formed Tubes, Inc.
1003 Prairie, Sturgis, Michigan
Write for **FREE Booklet**



average on all three criteria, as this summary table shows:

	Percentage Increase or (Decrease) from 1955	Automotive Industry as a Whole
Industry sales	2.8%	11.0%
Industry profits	(6.8)	10.0
Chief executives' compensation	(1.1)	5.1

Turning first to sales volume, the automotive industry is at the bottom of the ranking of the 18 industries. On profits, it is next to the bottom of the list, cushioned only by the volatile textile industry in the cellar. It is third from the bottom on a ranking by change in chief executives' compensation, followed by retail chains and textiles. In 1955, of course, the automotive industry ranked near the top of each ranking by the key criteria. It is interesting to note that the textile industry experienced the same reversal in position 1956 over 1955 although not over a long period of time.

1957—A Bright Outlook

The record, at this writing in 1957's third quarter, shows an increase in vehicle output for the

industry of somewhere between 13 and 15 per cent. And sales and earnings reports of the major companies are improving. Since such a major part of the total industry is oriented to the volume output from Detroit, the outlook for the industry as a whole is bright. Every indication is that the final quarter will be a good one, compared to 1956. As the correlation between profit improvement and compensation rewards is close, it would appear that executives can expect more compensation. This would not necessarily apply, of course, to the specialty-vehicle manufacturers who did well in 1956 or to those parts manufacturers who look to other industries for an important part of their volumes.

*Readers of
AUTOMOTIVE INDUSTRIES
are always well informed*

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\$10.00 Trial Offer No. 1: eight $\frac{1}{8}$ ", ten $\frac{1}{4}$ ", eight $\frac{3}{8}$ ", ten $\frac{1}{2}$ " pipe thread **TRU-O-SEAL** Fittings.

\$10.00 Trial Offer No. 2: eight $\frac{1}{2}$ ", ten $\frac{3}{4}$ ", four 1" pipe thread **TRU-O-SEAL** Fittings.

Send order to

TRU-O-SEAL DIVISION
Flick-Needy Corp.
2028 N. Hawthorne Melrose Park, Ill.

"Miller Fluid Power" is also a Div. of Flick-Needy Corp.

1
Thread **TRU-O-SEAL** on pipe or fitting (no messy pipe "dope" needed).

2
Thread pipe or fitting 4 threads into part. Point in desired direction.


3
Tighten **TRU-O-SEAL** to complete leakproof assembly (only light torque required).

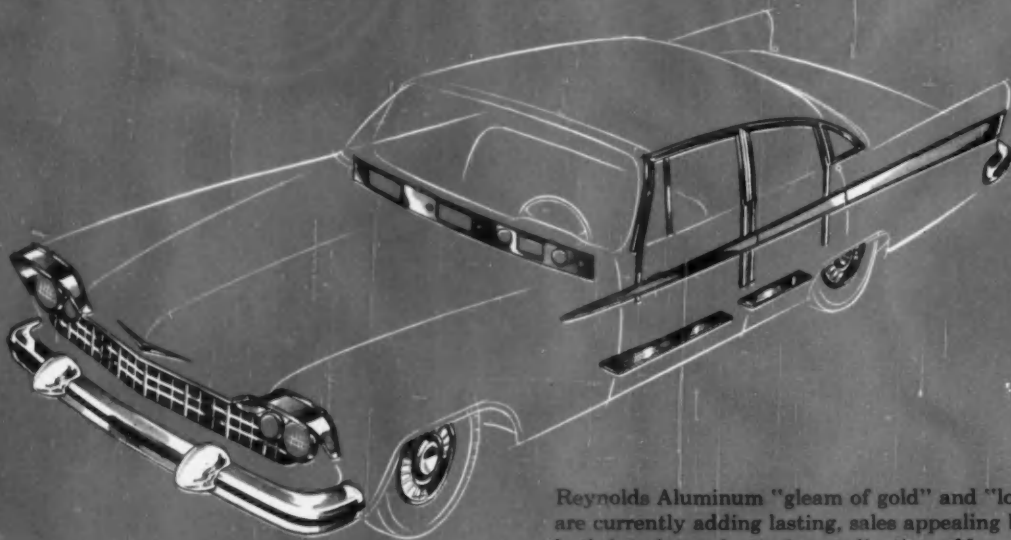


adds colorful, lasting,
sales appealing beauty...
increases design flexibility



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THE METAL FOR AUTOMATION

TRADE MARK

Reynolds Aluminum "gleam of gold" and "look of sterling" are currently adding lasting, sales appealing beauty in both interior and exterior applications. Now—for still broader interior use in instrument panels, seat skirts and many trim parts—a variety of exciting finishes are intriguing automobile manufacturers. These aluminum parts will not rust, chip, pit, peel or flake. They create customer appeal . . . assure lasting beauty . . . increase design freedom . . . offer a "new look" at modest cost . . . permit manufacturing economies.

Strong, lightweight aluminum mill products from Reynolds and parts from Reynolds Aluminum Fabricating Service are in wide use in the automotive industry. The photos on this page illustrate examples of Reynolds vast fabricating and finishing facilities. From these facilities come quality parts . . . quality controlled from mine to finished part and backed by Reynolds technological know-how in producing and fabricating aluminum. Economical parts, too, because of Reynolds tremendous variety of the most modern fabricating and finishing equipment.

For details on these facilities and for the assistance of Reynolds Aluminum Specialists on mill product applications or on fabricated parts, contact your nearest Reynolds Office. Or write *Reynolds Metals Company, Fisher Building, Detroit 2, Michigan* or *Reynolds Aluminum Fabricating Service, 2010 South Ninth Street, Louisville 1, Kentucky*.



This new Reynolds automatic aluminum finishing system can finish mixed sizes and types of automobile parts and chemically brighten or anodize them in different colors—and can handle several different jobs at the same time. An automatic coding system establishes the individual finishing specifications for each job.



The tanks in this new Reynolds anodizing installation can handle parts 24' long, 12' high and 4' wide, making it possible to handle hundreds of trim parts at one time. This half-block long system is another new addition to Reynolds multimillion dollar finishing facilities investment.



Part of a battery of Reynolds new high speed buffing equipment used here on 1957 hood moldings.



Part of a battery of Reynolds high speed coil fed presses used in the fabrication of automotive parts.

NOTE: Before you buy any part—have it priced in aluminum. Basic material costs do not determine part costs. New techniques and processes—applicable only to aluminum—can give you a better product at a lower final cost.

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This floor has a distinction of handling a greater variety and higher quality of induction heating equipment than any other floor in the world. Every kind of induction heating unit from 60 to 450,000 cycles, including some of the largest ever built, passes through here.

Magnethermic makes a complete range of induction heating equipment. To a buyer this range offers an important advantage ... **He can expect an unbiased recommendation from Magnethermic.**

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Heating
Equipment
60 to 450,000
cycles

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Why American Brakeblok can slash time and still meet toughest specs

Research: Your new friction engineering problems may already be solved, or are well on the way to solution. Hundreds of formulas for asbestos-base, semi-metallic and metallic friction materials have been developed by our research staff, and are ready now for tomorrow's needs.

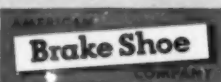
Testing: Continuous testing in the lab and on the road enables us to provide comprehensive reports covering every factor influencing performance and service life. In many cases, this service saves our customers weeks of exhaustive testing.

Production: Three modern plants in the U. S. A. can

meet the needs of millions of vehicles and machines every year. Point-by-point production, precisely controlled, insures top quality of every part.

Service: Sales engineers are your liaison with ABB. They know their field, and are at your disposal—virtually members of your project team. Even when design changes in midstream, they can shift ABB to meet the new requirements immediately.

To take full advantage of these American Brakeblok facilities, we suggest you check with us during your initial planning stage. A call or letter will bring immediate action.



AMERICAN BRAKEBLOK DIVISION
DETROIT 9, MICHIGAN



Engineered by Tinnerman...

On the assembly line...and in the field plug-in **SPEED CLIPS®** simplify rectifier installation

At General Electric, two variations on a single SPEED NUT® principle are being used to make things easier for production-line assemblers and for electronics servicemen.

The basic idea of the Tinnerman front-mounting SPEED CLIP is incorporated into the sockets of GE germanium rectifiers made by GE's Semiconductor Products Department, Syracuse, for industrial electronics applications.

On the TV production line, the Tinnerman SPEED CLIP permits rapid, tight, and simple installation of rectifiers. In the field, merely by unplugging the original equipment rectifier and plugging in its germanium replacement, the serviceman can quickly get a unit back in service.

Working together, General Electric and Tinnerman engineers developed the two types of SPEED NUT parts that are fabricated right into the rectifier shells.

Unusual applications of the SPEED NUT principles to scores of different products are developed every day at Tinnerman. That's why over 9,000 different forms of SPEED NUT Brand Fasteners

have been designed for all leading manufacturers.

Your fastener problem can probably be solved quickly by a call to your Tinnerman sales representative. If his name isn't in your telephone directory, write to:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P. O. Box 6688 • Cleveland 1, Ohio

TINNERMAN

Speed Nuts®



FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Trofrest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.



BEFORE BRUSHING

Aircraft part formerly hand-finished to remove burrs and sharp corners. Hand-finishing time: 15 minutes.

5 times as fast

AFTER BRUSHING

Burrs are efficiently removed, edges and surface junctures are precision blended to microinch tolerances. Osborn Power Brush Finishing time: 3 minutes.

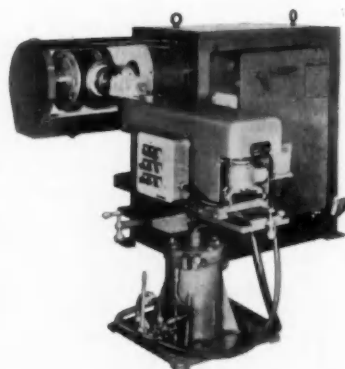
OSBORN Brushmatic® saves 180 hours a month

ALL edges and surface junctures of this aircraft component must be blended to microinch specifications to eliminate stress concentrations and ultimate fatigue cracks.

Previously, this surface blending had to be done by hand . . . requiring considerable skill and time. Still, results were inconsistent . . . rejects were high, calling for reworking and re-inspection.

Using Osborn's Brushmatic® Machine, the operation that once took 15 minutes is now done in 3 minutes . . . a 400% increase in output per man—and a saving of 180 hours a month.

This kind of precision finishing can save money on many types of products you manufacture today. An Osborn Brushing Analysis, made in your plant, will show you how. Write us for details—and for your copy of the 100-page Osborn Catalog 210-C . . . and for the 20-page Brushmatic® booklet. *The Osborn Manufacturing Company, Dept. E-57, Cleveland 14, Ohio.*



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ENTER THIS CONTEST ... 90 CASH PRIZES!



CONTEST RULES

1. Tell in 25 words or less "Why I prefer Albanene tracing paper."
2. Send all entries to K&E Albanene Contest, Box 160, New York 46, N. Y. Enter as often as you wish. There is nothing to buy.
3. Entries must be postmarked not later than midnight, Nov. 30, 1957.
4. Entries become the property of Keuffel & Esser Co. None can be returned.
5. The decision of the judges is final.
6. Winners will be notified by mail. A complete list of winners will be sent upon request, providing request is accompanied by stamped, self-addressed envelope.
7. Contest is open to all residents of continental United States, except employees, and their immediate families, of Keuffel & Esser Co. and its subsidiaries and dealers; its advertising agency; and judges of this contest.
8. Also not applicable to residents of those states where there are prohibitory laws.

Why I prefer **ALBANENE**® Tracing Paper...

First prize \$1500
Second prize \$1000
Third prize \$ 500
plus 87 prizes of \$25 each!

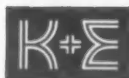
In 25 words or less, tell us why you prefer K&E Albanene® tracing paper. Your reasons may win one of these 90 prizes (it's K&E's 90th anniversary).

Here's a hint: Albanene is made from 100% rag stock for superlative tear strength. It is permanently transparentized with an inert resin. Draftsmen like it because of its easy drawing qualities . . . reproduction men for its high transparency and permanence. Everybody likes it because "what you

pay for stays in the paper." That's why Albanene is the best seller among *all* tracing papers.

Get contest aids from your K&E dealer: Information booklets, extra contest entry blanks, samples of Albanene, too, if you need them. You can enter as often as you please.

Or use a plain sheet of paper if someone's already snipped the blank below. Give your name, address, and firm name, twenty-five words or less telling why you prefer Albanene tracing paper, and mail to K&E Albanene Contest, Box 160, New York 46, N. Y. before midnight, November 30, 1957.



KEUFFEL & ESSER CO.

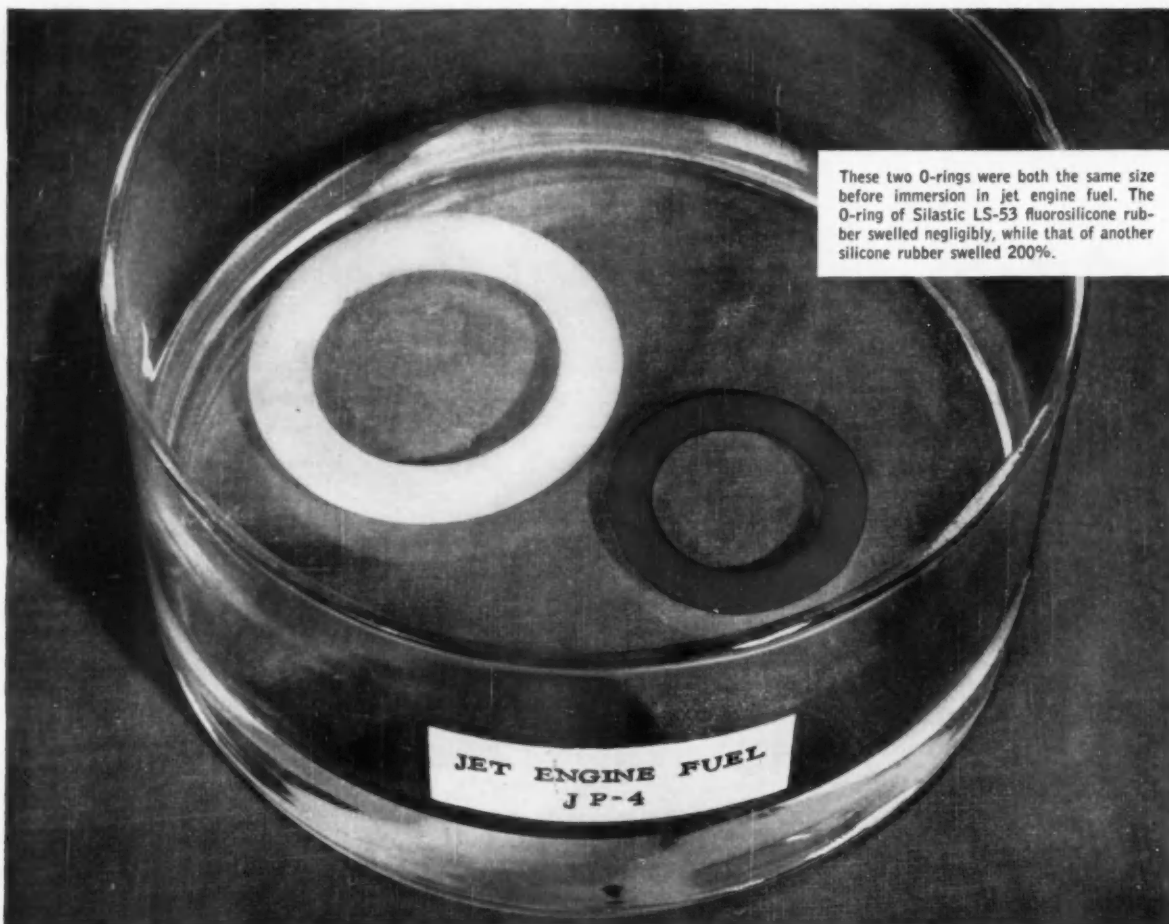
New York, Hoboken, N. J., Detroit, Montreal, Chicago, St. Louis, Dallas, San Francisco, Los Angeles, Seattle. Dealers in principal cities

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These two O-rings were both the same size before immersion in jet engine fuel. The O-ring of Silastic LS-53 fluorosilicone rubber swelled negligibly, while that of another silicone rubber swelled 200%.

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now resists fuels, oils, solvents

For resistance to fuels, oils and solvents, specify Silastic LS

Aircraft and automotive fuels, oils, and solvents won't deteriorate Silastic* LS-53, a new Dow Corning fluoro-carbon silicone rubber. Silastic LS-53 has unusual resistance to other organic chemicals as well as silicone fluids. In physical properties, such as low compression set and serviceability at -80 or 500 F, Silastic LS-53 resembles other silicone rubbers. Available from leading rubber companies.

Get latest data on Silastic. Mail coupon today

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Please send me latest data on Silastic

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Typical Properties of Silastic LS-53

(cured 24 hours at 300 F)

• Tensile strength, psi	1000
• Elongation, %	170
• Compression set, %, 22 hrs @ 300 F	22
• Brittle Point, °F	-90
• Solvent Resistance, % swelled	
ASTM No. 3 Oil, 21 days @ 300 F	3
Jet Fuel JP4, 15 days @ 250 F	18

If you consider ALL the properties of a silicone rubber, you'll specify SILASTIC

first in
silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

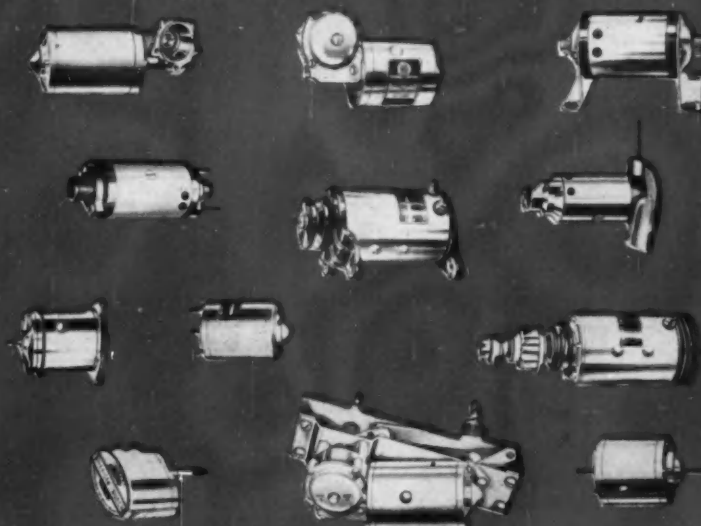
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in modern vehicle design

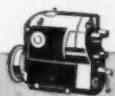
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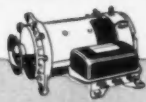
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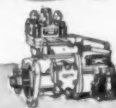
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...as **EVANS HEATERS** are right for trucks !

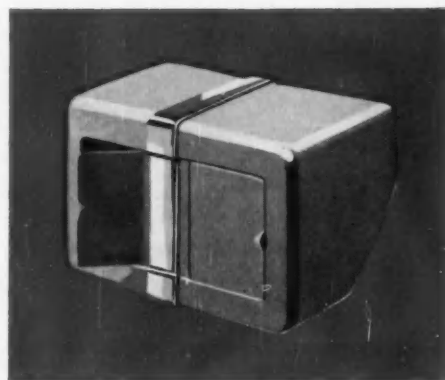
Tough jobs call for the right equipment. Heavy snow can't be cleared with a shovel and broom, and a truck can't be adequately heated by a heater built for passenger cars.

Evans heaters are right for trucks because they're built for trucks. They have the same rugged dependability you build into your trucks . . . the same high standards of manufacture that guarantee peak performance and low maintenance costs. The heaters Evans engineers design and custom-build for you will meet all your truck requirements. Our engineers will be glad to call and discuss your heater problems for any truck model, present or future. For information write Evans Products Company, Dept. P-11, Plymouth, Mich.

Regional Representatives: Cleveland, Frank A. Chase
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BECAUSE THEY'RE BUILT FOR TRUCKS**

EVANS PRODUCTS COMPANY ALSO PRODUCES:
railroad loading equipment; bicycles and velocipedes; Evaneer fir plywood;
fir lumber; Evanite battery separators and Evanite hardboard.



M & M develops another specialized machine

New automatic inline transfer machine

handles 650 pistons per hour at 100% efficiency

Pistons are delivered to the first station of machine by a conveyor. They are picked off this conveyor, loaded into the machine, processed and delivered to another conveyor . . . all automatically. Here is the sequence of operations performed:

Station 1—Accept and unload piston from conveyor chute.

Station 2—Orient piston in relation to pin bores and bosses, using an electric eye and orientating table.

Station 3—Push piston down against positive locator by means of hydraulic expanding lug. Drill center of dome end and spot face two sections from the bottom upwards.

Station 4—Mill weight pads.

Station 5—Spot drill drive holes in weight pads.

Station 6—Drill drive holes in weight pads.

Station 7—Ream drive holes in weight pads.

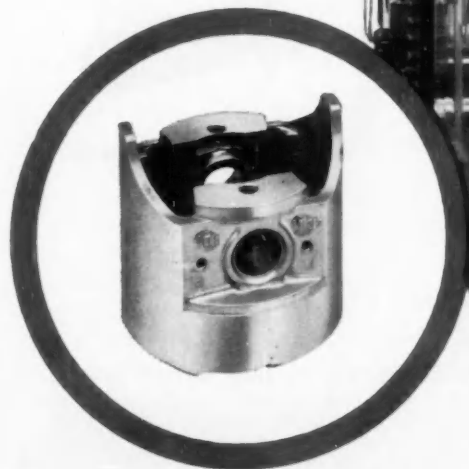
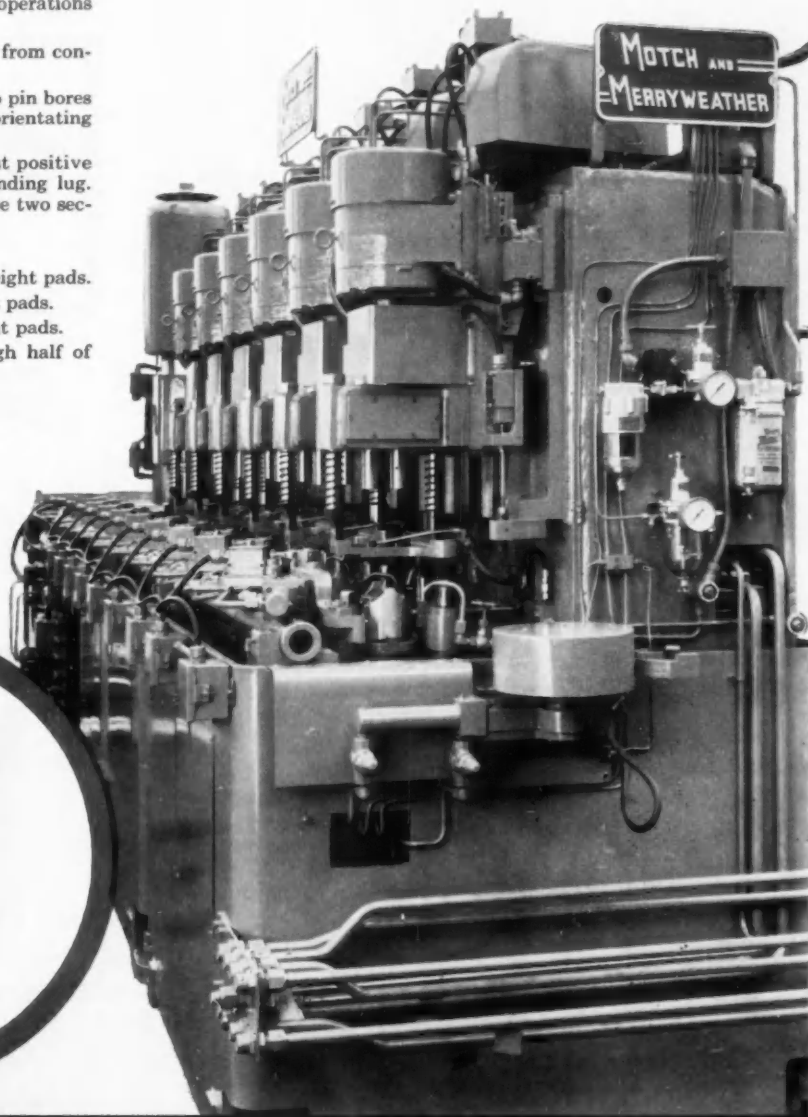
Station 8—Drill two oil holes through half of pin boss.

Station 9—Drill two oil holes half-way through other half of pin boss.

Station 10—Drill two oil holes completely through other half of pin boss.

Station 11—Dump chips and unload to conveyor.

Always consult M & M first for all types of specialized machine tools.



The **MOTCH & MERRYWEATHER MACHINERY** *Company*

MACHINE TOOL MFG. DIVISION
CLEVELAND, OHIO

Solve Your *Special* Resistance Welding Problems with Mallory *Standard* Electrodes

BEFORE you pay the extra price of special electrodes, both in added cost and longer delivery, it pays to check the many types available as standard from Mallory.

In the Mallory standard list are literally hundreds of designs . . . all available promptly, manufactured by existing tooling. Many are carried by Mallory distributors for immediate delivery. Included are cold formed single and double bend types—cast and forged off-set designs—a wide choice of nose shapes, tapers and lengths—and models with Mallory's special fluted cooling hole, for efficient cooling right up to the electrode face. All are made from the specialized alloys and by the precision manufacturing methods that Mallory has developed during more than thirty years of resistance welding leadership.

Your local Mallory Welding Distributor can lend valuable help in working out ways to use this broad line of electrodes to solve "special" problems at "standard" prices. And he can give you prompt delivery, usually from his local stock, of exactly the electrodes you need. Write to us today for the name of the Mallory Welding Distributor nearest to you.

Over 30 Years of Resistance Welding Leadership

*In Canada, made and sold by Johnson Matthey and Mallory Ltd.,
110 Industry Street, Toronto 15, Ontario*

Serving Industry with These Products:

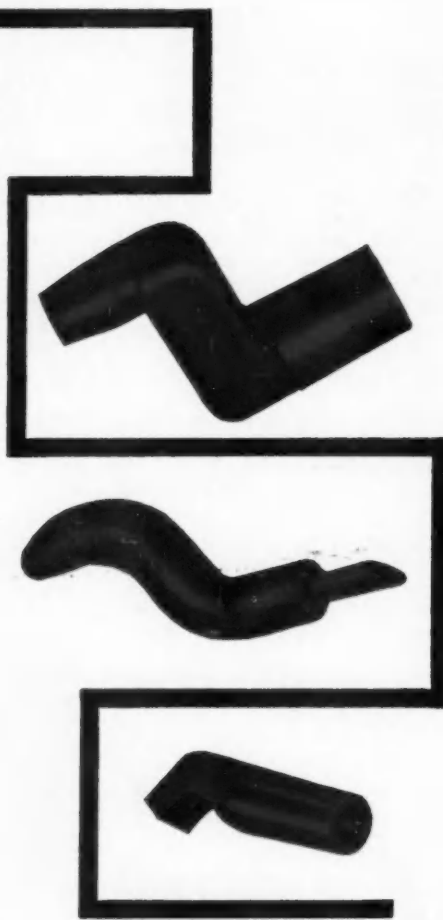
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For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio



Quenching and Tempering Alloy Steels

Of the various methods of heat-treating alloy steels, the most important is that involving quench and temper. This method, which enhances the mechanical properties of the end product, differs materially from normalizing and annealing (previously discussed in this series).

The purpose of quenching is to effect a cooling rate sufficient to develop the desired hardness and structure.

Before quenching takes place, steel is heated to a point above the transformation range. Quenching is the subsequent immersion of this heated steel in a circulated or agitated bath of oil, water, brine, or caustic; or, in the case of austempering or martempering, generally in agitated molten salt baths. Austempering and martempering are preferable where a minimum of distortion is desired.

Quenching *increases* the tensile strength, yield point, and hardness of alloy steels. It *decreases* ductility—that is, elongation and reduction of area. It also decreases resistance to impact. However, by means of tempering, it is possible to restore some of the ductility and impact-resistance—but only at a sacrifice of tensile strength, yield point, and hardness.

The results of mild oil- or water-quenching as related to mass effect can be found in the end-quench hardenability test. Voluminous data concerning this test are issued by AISI and SAE in the form of hardenability bands for the various grades of alloy steels.

If thermal cracking is to be avoided, cooling by liquid quenching should not be carried to a point below 150 deg F. When a temperature of 150 deg F is approached, im-

mediate tempering should follow. Because of residual stresses, no steel should be used in the as-quenched condition.

Tempering can be defined as reheating to a specified temperature below the lower critical range, followed by air cooling. It can be done in furnaces, oil, or salt baths, the temperatures varying from 300 to 1200 deg F. With most grades of alloy steel, it is best to avoid temperatures between 500 and 700 deg because of the "blue brittleness" that occurs in this range. Maximum hardness and wear-resistance result from tempering at low temperatures; maximum toughness is achieved by tempering at the higher levels. Of course, one of the essential reasons for tempering is to relieve the residual stresses set up in quenching.

Bethlehem metallurgists have devoted years of study to quenching, tempering, and other phases of heat-treating. By all means call them if they can be of service to you. And please remember, when you are next in the market for alloy steels, that Bethlehem makes all AISI standard grades, as well as special-analysis steels and the full range of carbon grades.

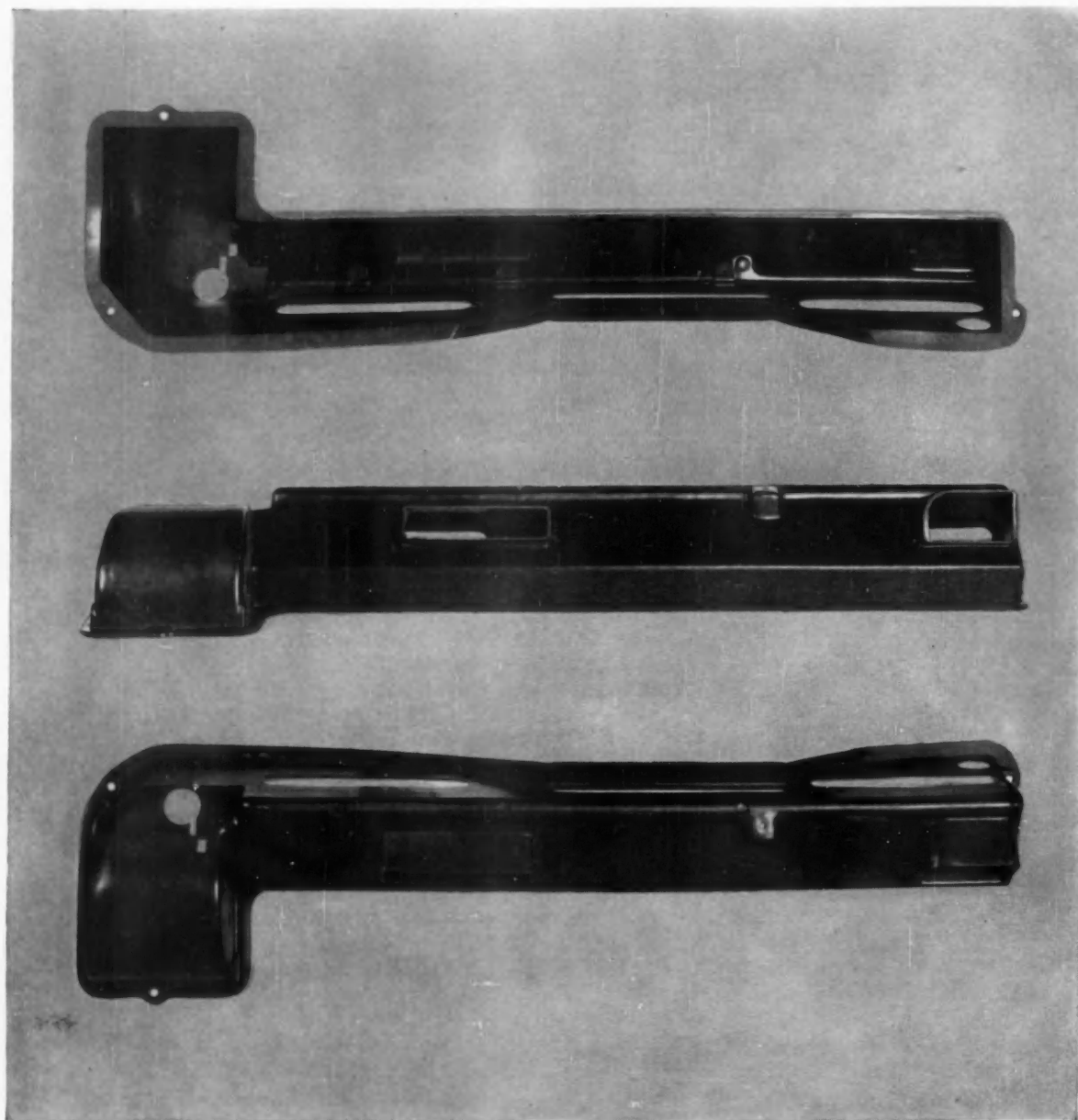
If you would like reprints of this series of advertisements from No. I through No. XX, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The first 20 subjects in the series are now available in a handy 36-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



BETHLEHEM STEEL



Heater housing, a premix molding by Woodall Industries, Inc., Detroit, Michigan.

Premix moldings save time, money and trouble

If your product calls for reinforced plastics, you'll save time, money and trouble with premix moldings. Small or large, simple or complex, you'll get quality molding faster and at less cost when resin and reinforcing fiber are blended beforehand.

Premix moldings eliminate resin-rich areas, provide uniform wall thicknesses and strength. They eliminate many finishing operations necessary in hand lay-up molding. Slots, grooves, holes, bosses and parts with varying wall thicknesses are

formed in the mold. For strong, rigid, reinforced plastics, premix moldings have proved ideal . . . on the production line as well as in the finished product.

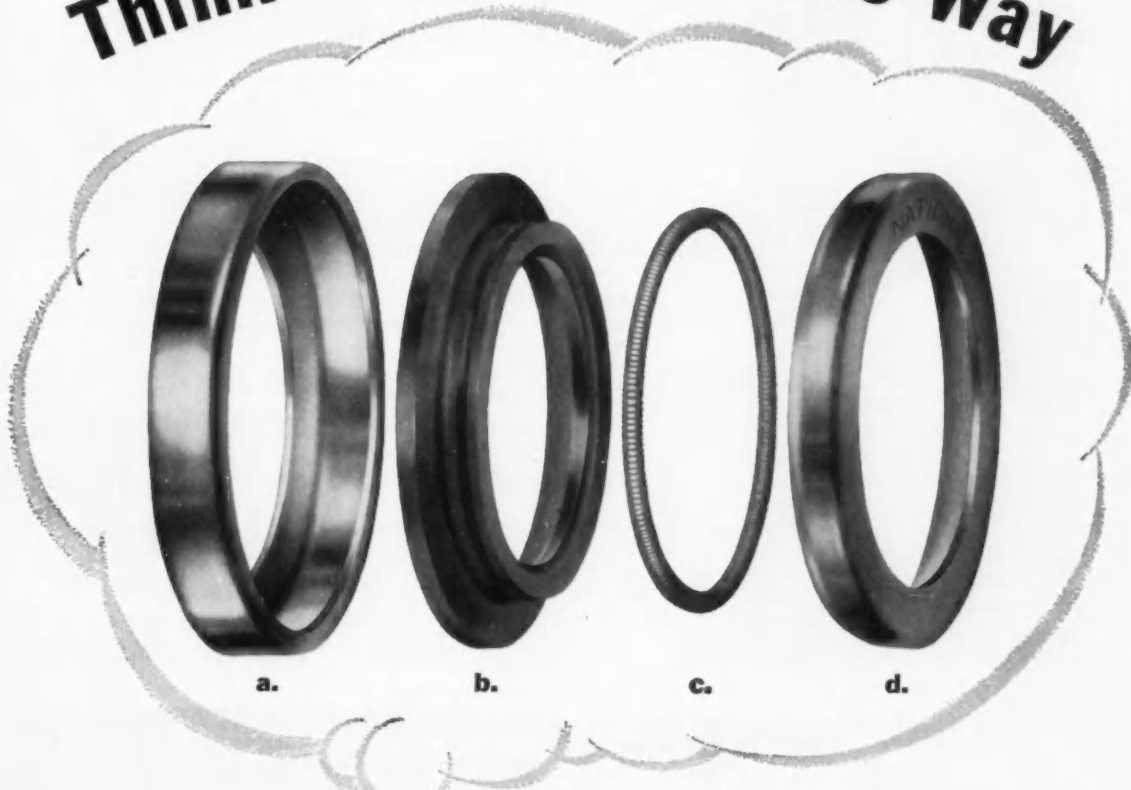
Polyester resin with Dow Vinyltoluene or Dow Styrene offers all the special properties necessary for successful premix moldings. Specify resins based on vinyltoluene—Dow supplies vinyltoluene to resin manufacturers. THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1888G.

YOU CAN DEPEND ON

DOW

When you design-in seals

Think of Oil Seals This Way



a. Outer Case

Formed to extreme close tolerance of heavy gauge steel with sufficient structural strength to maintain precision dimension.

b. Sealing Lip

Properly prescribed material either compounded or processed for application conditions of temperature and eccentricities. Precisely molded for correct shaft interference, low torque and positive sealing.

c. Tension Spring

Carefully engineered as to metallurgy, heat treatment and coil diameter to provide uniform compressive force on the sealing element.

d. Inner Case

Strengthens, protects; sturdy gauge steel formed to close tolerances.

A good oil seal is a carefully engineered, precision manufactured assembly of carefully engineered, precision manufactured components. Each part must be exactly right *for the given application* or the seal will not function properly.

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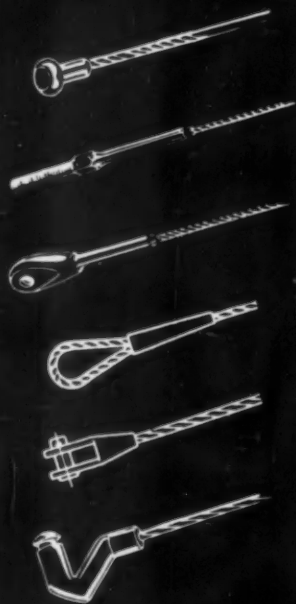
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For many years Bergen has met the most exacting specifications of the Armed Forces and industry . . . assemblies of every type, standard or special fittings, swaged, spliced, socketed, welded, soldered or pressed . . . in any quantity from one to a million.

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NEW HIGH SPEED ADJUSTABLE CLOSURES, IN A WIDE VARIETY OF SIZES AND SHAPES, CUT PRODUCTION TIME AND COSTS!



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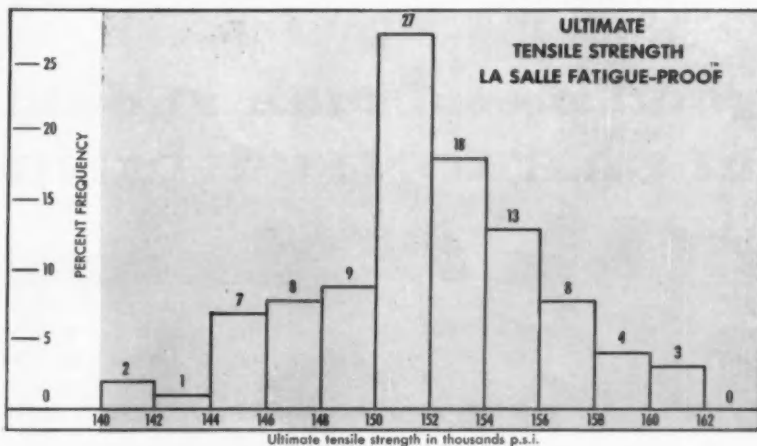
Cam or Lever Action Test Plugs and Seals designed for high production use!

Snap-Tite types for use during processing of machine parts, tubes, molds, castings, tanks and for testing low pressure applications. Turn-Tite types for higher pressure applications. Also where restricted clearance prohibits cam action closure. Also types to accommodate pressure line connector. Snap-Tite and Turn-Tite also used as permanent parts of finished products.

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(Advertisement)



The above chart shows the range of ultimate tensile strength over a period of one year's production. Average value obtained is approximately 150,000 p.s.i.

"e.t.d."TM Process Applied to FATIGUE-PROOFTM Steel Bars Gives Added Strength, Greater Uniformity, Better Machinability

Guaranteed 140,000 p.s.i. minimum tensile... no heat treating necessary

Six important physical and mechanical properties, (1) a high strength level, (2) exceptional uniformity, (3) improved machinability, (4) wear resistance, (5) resistance to fatigue, and (6) dimensional stability, are desirable features of La Salle "FATIGUE-PROOF" steel bars, produced by the new "e.t.d." (Elevated Temperature Drawing) process.

Strength . . . "FATIGUE-PROOF" is a carbon steel bar which replaces both hot-rolled or cold-finished carbon and alloy heat-treatable steel bars. Production figures show hardnesses between Rc 30 and Rc 36 (with a minimum hardness guarantee of Rc 30). The guaranteed minimum tensile strength is 140,000 p.s.i. with a 150,000 p.s.i. average.

"FATIGUE-PROOF" is better than a heat treated bar because it is not quenched and tempered and so the problems frequently associated with quenching and tempering such as (1) quench cracks, (2) non-uniformity of section, (3) soft centers, and (4) heat treat distortion are eliminated. Costly secondary operations such as grinding, cleaning, and straightening are not necessary. Rejects are minimized.

Exceptional uniformity... "FATIGUE-PROOF" is remarkably uniform from bar to bar, end to end, size to size, and lot to lot. Design and production engineers can depend upon it being the same from day to day and job to job.

Individual processing of each bar plus the inherent good qualities and characteristics of the "e.t.d." process account for the excellent uniformity. Microstructures are uniformly pearlitic.

Improved machinability... "FATIGUE-PROOF", made by "e.t.d.", machines 50% to 100% faster than heat treated alloys, and 25% faster than annealed alloy steels. It machines with a very fine finish, and gives excellent tool life. These characteristics make it an ideal steel for production parts.

Wearability . . . Field applications such as gears, pinions, pins, and screws prove that "FATIGUE-PROOF" has good wear resistance. It resists galling and seizure, partly due to its hardness . . . and probably due to the anti-weld characteristics of its chemistry. Further, "FATIGUE-PROOF's" pearlitic structure appears to resist sliding wear better than a quenched and tempered structure of equal hardness.

Resistance to fatigue . . . The chief reason for the failure of highly stressed parts is fatigue. While part shape, unfavorable residual stresses, tool marks, gouges in highly stressed areas, and many other factors contribute to fatigue failure, most materials have also an inherent quality . . . endurance limit that is an indication of ability to resist fatigue.

"FATIGUE-PROOF" has this inherent

quality to resist fatigue. Laboratory tests prove that fatigue properties are at least comparable to those of expensive heat treated steels of the same strength level. Numerous field tests, under severe operating conditions, have proved this to the satisfaction of many manufacturers.

Dimensional stability... "FATIGUE-PROOF" maintains a high degree of dimensional stability in machining because of its low order of residual stresses.

Details of the e.t.d.TM process . . . Elevated Temperature Drawing involves (1) the selection of bar chemistry, (2) the amount of reduction in cross-sectional area of the bar as it is drawn through a special die, and (3) a preselected elevated drawing temperature which will result in the desired final properties.

Although the "e.t.d." process was first announced early in 1957, it has been used in the production of "FATIGUE-PROOF" steel bars since September 1955. Four U.S. Patents (Nos. 2,767,835, -6, -7, and -8) were granted October 23, 1956, covering the "e.t.d." process — an exclusive development of La Salle Steel Company.

How manufacturers can obtain sample Fatigue-Proof steel bars for testing

LaSalle Steel Company has announced that samples of "FATIGUE-PROOF" steel bars, made by the "e.t.d." (Elevated Temperature Drawing) process, are available for test purposes on a no charge basis to manufacturers where it appears that "FATIGUE-PROOF" can help improve products and reduce production costs.

Applications for a sample bar are invited from manufacturers making parts from either hot-rolled or cold-finished carbon or alloy steel bars which require high tensile strength.

Interested manufacturers may write for a test sample by sending a blueprint or application details direct to LaSalle Steel Company, Advertising Department, P. O. Box 6800-A, Chicago 80, Ill.

"FATIGUE-PROOF" is also available from your steel distributor . . . write for his name.

Brochure tells story of Fatigue-Proof steel bars

"A New Material" is the title of a 24-page booklet which gives detailed information covering La Salle "FATIGUE-PROOF" steel bars made by the Elevated Temperature Drawing process.

The booklet presents the results of more than one year's tests of production samples and reports on eight application case studies. Copies available on request.

TM—Trademarks of La Salle Steel Company



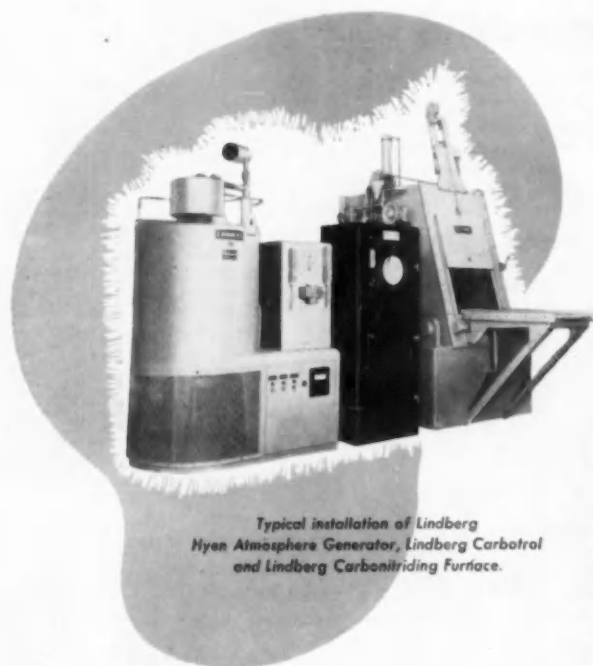
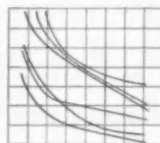
La Salle STEEL CO.

1438 150th STREET
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What every good metal man should know about CARBONITRIDING

First of all, it is a good idea to know what equipment will do the best carbonitriding job for your specific requirement. And the best way to find this out is to talk over your problems with the people who have consistently developed the methods and equipment for better, more dependable, more economical carbonitriding results. That would be Lindberg.

Let's look at the record. Lindberg's contributions to carbonitriding and carburizing go far beyond just the building of furnaces to do it. It covers the development of controlled atmosphere generators, the creation of dew point equilibrium curves to establish proper atmosphere values for type of steel and temperatures involved and the exclusive Lindberg Carbotrol to maintain these values automatically in production.

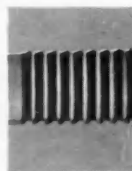


Typical installation of Lindberg Hyen Atmosphere Generator, Lindberg Carbotrol and Lindberg Carbonitriding Furnace.



Then there is the invention of the "dimple" vertical radiant tube which gave new efficiency and economy to fuel-fired atmosphere furnaces. Lindberg's exclusive CORR THERM electric heating element made practical the use of electricity in atmosphere furnaces.

Add to this our record over the years of building a broad variety of carbonitriding and carburizing furnaces, big ones, small ones, manuals, automatics, fuel-fired, electric, and it seems it's just good common sense to bring your heat treating problems to us. Just get in touch with the Lindberg Field Representative in your locality or write:



LINDBERG ENGINEERING COMPANY

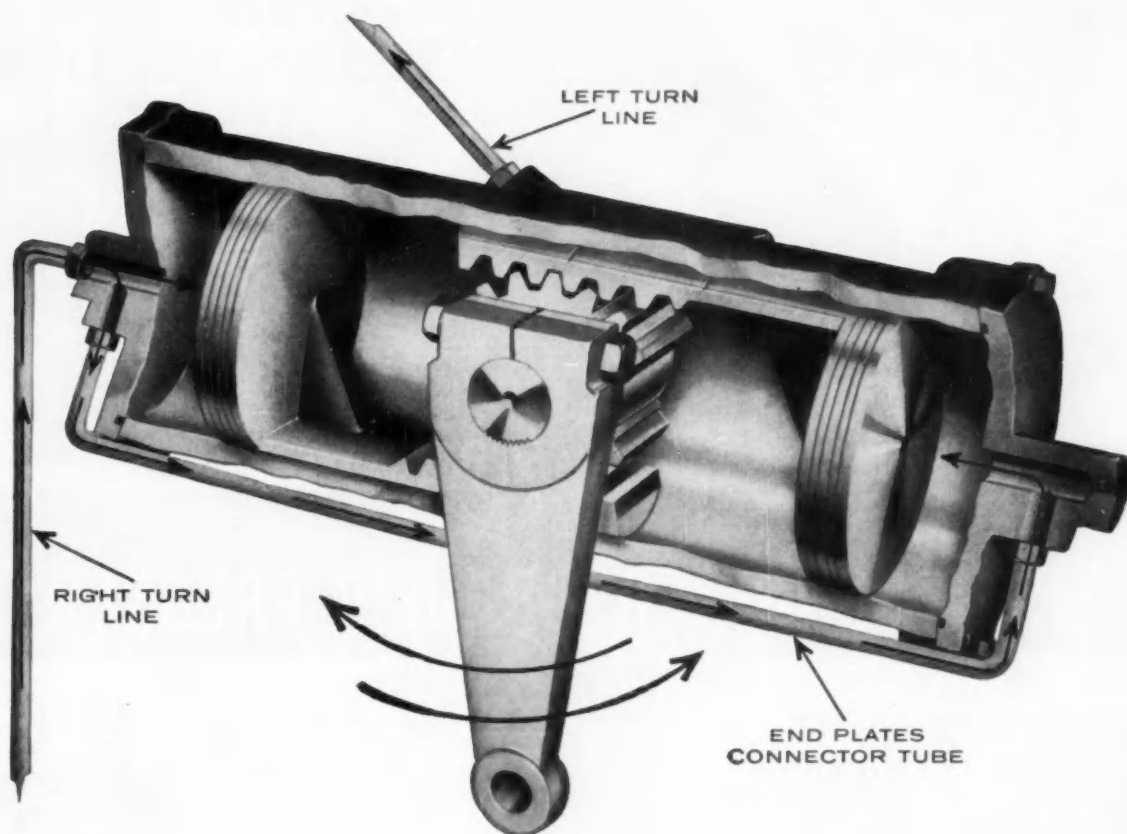
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26,000 inch pounds torque output. These parameters can be varied to obtain a custom installation. Also, over-running clutches, sprockets, gears, chains, etc., are easily adapted to the output shaft to further increase its versatility.

Precision engineered, the Thompson Power Cylinder is as dependable as it is versatile. You can count on a long, continuous, trouble-free life.

To learn more how the Thompson Power Cylinder can save you money in design, manufacture and installation costs, write for our free book-

let. Described are many of its diverse uses and additional benefits. Mail to Thompson Products, Inc., Michigan Division, 34201 Van Dyke Avenue, Warren, Michigan.

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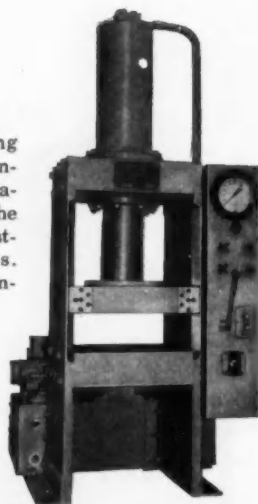
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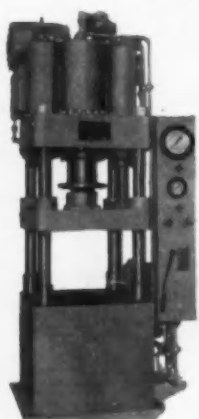
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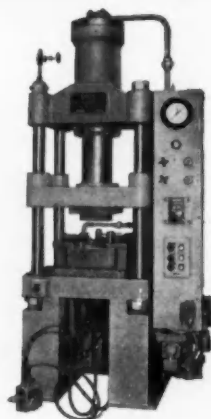


75-ton down-moving press of side plate construction. Moving platen is guided on the four-corners by adjustable guide plates. Pressing speed is manually controlled.

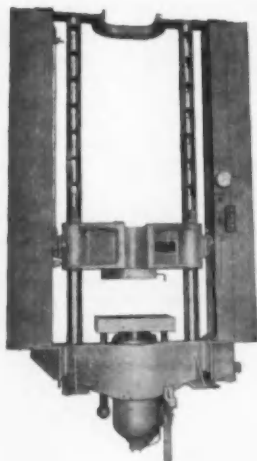


125-ton manually controlled riveting press. Designed to clamp motor laminations and upset rivets. Features upper and lower 75-ton riveting cylinders, two 25-ton double acting clamping cylinders.

These **4**
hydraulic
presses . .



75-ton self contained semi-automatic hydraulic press used to rivet electric motor components. Adjustable speed, tonnage.



200-ton two-rod forcing press with a power driven moving abutment. Opening is adjustable in increments of 12". Sensitive manual controls with 24" working stroke.

were designed and built by Erie Foundry Company for one of the country's leading electrical manufacturers. Although each press was designed to perform a specific operation with increased efficiency, they are easily adaptable to many uses. These presses demonstrate a range of design and feature both semi-automatic and manual operation. Each Erie Foundry press allows its operator to control his work precisely.

If a hydraulic press can reduce your manufacturing costs, it will pay you to talk with one of Erie Foundry's engineers to discuss your specific requirements. Just write.

Hydraulic Press Division

ERIE FOUNDRY CO.
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NEED A SPECIAL RUBBER PART TO LICK A TOUGH PROBLEM?



**4-STEP
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assures a better end product

Compounding special rubber to meet specific product requirements has been a Phoenix specialty for over 25 years.

Phoenix 4-Step Service can help you use natural or synthetic rubber in designing a better and often cheaper end product:

We will (1) analyze your problem, (2) assist in designing the rubber component, (3) compound and test the most suitable rubber and (4) manufacture the part with traditional Phoenix craftsmanship.

A Phoenix representative will gladly show you how Phoenix 4-Step Service can help you lick a tough product problem, as it did in case of the flexible coupling below.



THE CASE OF THE FLEXIBLE COUPLING

A flexible coupling component of an automobile window and seat assembly called for rubber bonded to nylon. The problem was to retain this bond under extreme torque running as high as 180°. Additionally, the rubber must not rupture, must be resilient and flexible to all temperatures and be resistant to oil. These characteristics must be retained for the life of the car.

Phoenix compounded a special synthetic rubber with all of the properties required and successfully bonded it to nylon. The component has surpassed all expectations, thanks to Phoenix skills with rubber.

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of Custom Molded
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Resistance Welding Structural Members



HELPS PUT PROFIT
INTO MANUFACTURING

How Massey-Harris-Ferguson Achieves Mass Production Economy on Short Runs

Among manufacturers whose production requirements for any given part are limited, resistance welding is often regarded as an impractical method of fastening. They agree it is fine for mass production where tooling costs and setup time can be spread out over tens of thousands of parts. But for them, the cost of tooling and fixturing anything but the simplest assemblies would be uneconomical.

The Cost Research Department of Massey-Harris-Ferguson, as part of a program to reduce manufacturing costs, undertook an investigation of resistance welding. Under the direction of Mr. E. E. Hart, the investigation emphatically proved the economy and dependability of the process for a wide range of limited production assemblies.

Simplification of setup is key

The Cost Research Department reasoned that the key to the entire problem depended entirely on minimizing setup time, complete simplification of tooling and fixturing and positive dependability and consistency of the fabricating method. Mr. Hart was convinced proper resistance welding techniques would satisfy all these requirements. Subsequent developments and testing proved him right.

How the problem was solved

Basic tooling and fixturing was built right into the welder. (See Figs. 1 and 2.) The various assemblies required

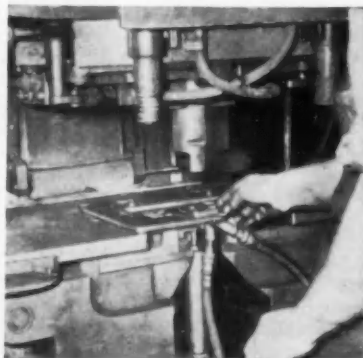


Fig. 1 Close-up of simple tooling required for a baler pick-up crank assembly.

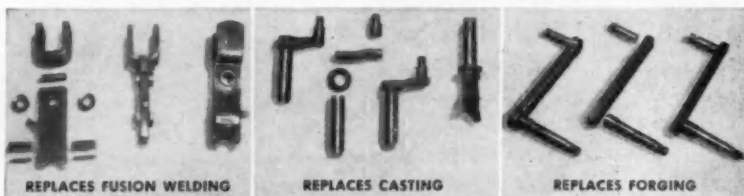


Fig. 3 Typical assemblies resistance welded on Sciaky equipment at M-H-F.

only the simplest tooling. Individual tooling for any assembly seldom cost as much as \$75 per welding setup.

Setup time for any assembly was reduced to an average of 30 minutes. The performance of the welders themselves was carefully studied and recorded. Machine control setup for any assembly was reduced to a simple matter of the briefest reference to graphs.

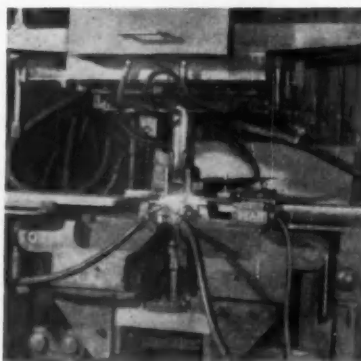


Fig. 2 Note universal fixturing table and simple dies used for welding a yoke assembly.

Cost reductions achieved

The large number of assemblies fabricated by resistance welding include many structural members. Castings, forgings and arc welded assemblies have been replaced with resistance welded assemblies of standard sheet or bar stock and screw machine products.

The cost of the resistance welded part averages 10 to 40% less than similar arc welded parts. The savings in time of the welding operation itself averages 60 to 90%. Castings and forgings suffer in comparison, with savings of over a dollar per unit not unusual.

Quality welding essential

The success of such a program requires that the welders be capable of producing consistently high quality welds with maximum ease of control setup. Sciaky patented three phase welders easily meet these requirements.

Detailed information available

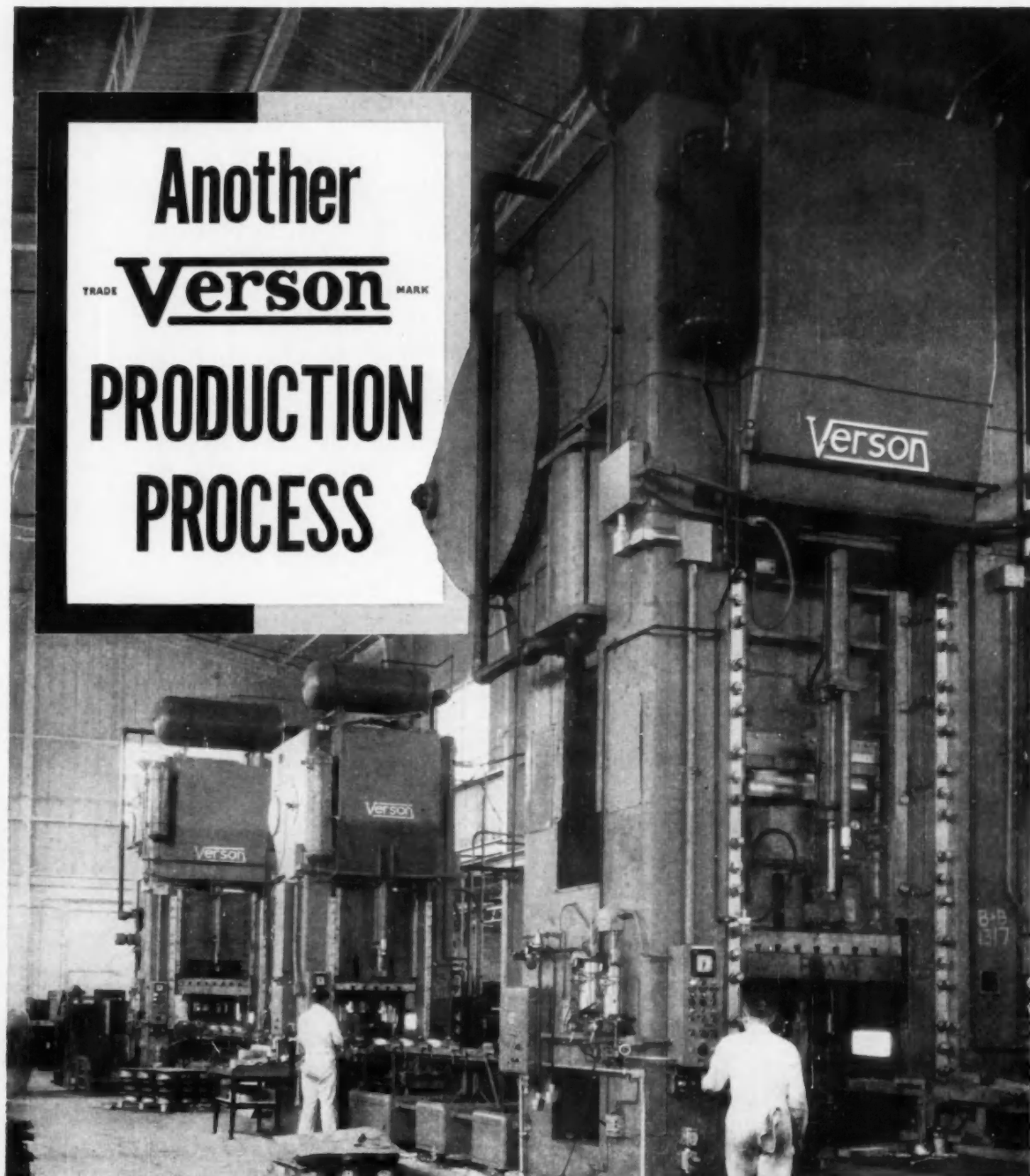
Two bulletins are available giving more complete information on the Massey-Harris-Ferguson program. "Resistance Welding at Work," Vol. 5, No. 1 (16 pages), gives data, including cost reductions, on 28 different M-H-F assemblies. An engineering report on "Design Standards" (48 pages) gives full technical data on the eight basic weld types employed. Copies of either or both bulletins are available on request.

Write today, mentioning the information you would like to receive. There is no obligation. Sciaky Bros., Inc., 4925 W. 67th St., Chicago 38, Ill. Portsmouth 7-5600.

DO YOU HAVE A RESEARCH PROBLEM?

Facilities of the Sciaky Research Division at Los Angeles, California, are available for contract research to answer resistance welding problems. Housed in a 15,000 sq. ft. building, these facilities include an experienced engineering staff, a complete range of the most advanced resistance welding machines including the largest in the world and a laboratory equipped for metallography, chemistry, electronics, photography and testing as applied to resistance welding. Write for further information and ask for the 20 page Research Division brochure.

Another **Verson** TRADE MARK PRODUCTION PROCESS



Engineered and Developed by **-Verson-** to Make Manufacturing More Profitable

Here is a good example of what Verson engineering can do in automated press lines . . . and this is no theoretical concept . . . it is a tried and proven production process which has been in operation for one year.

Three Verson Eccentric Presses (1500, 200 and 600 tons respectively from front to rear in above photograph) are synchronized with automatic transfer and

feeding equipment. The part produced is an automotive transmission drive housing.

As a manufacturer of both Transmat and automated press line processes and related tooling, Verson is well qualified to assist you in high production automatic stamping problems. For specific recommendations send an outline of your requirements.

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MACHINING PERFECTION always starts with the right steel

*Pick exactly the right steel for any job
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with J & L 1113 Bessemer steel"***

This friction shaft part for a textile machine was converted to J&L "1113" Bessemer steel with these results:

- Time cycle reduced 20%
- Surface finish improved 20%
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Due to these savings, manufacturer is now using J&L "1113" steels for other applications. You can get similar savings in cutting speeds and tool life. Get facts from your distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

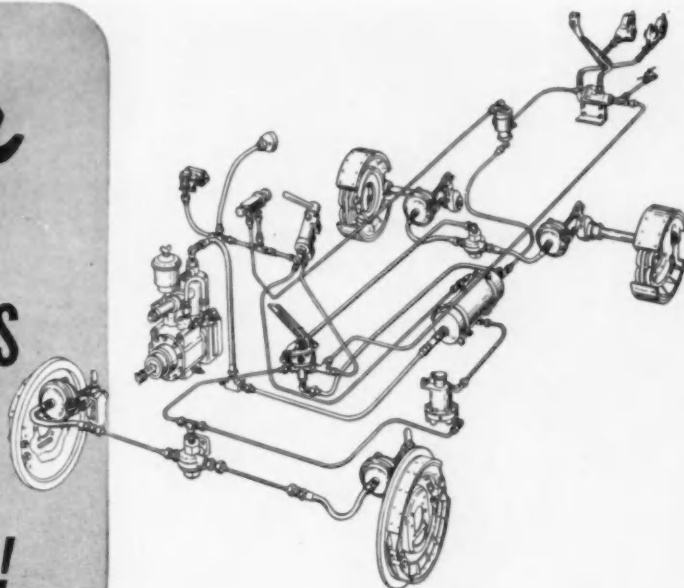


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STRAIGHT AIR BRAKE SYSTEMS

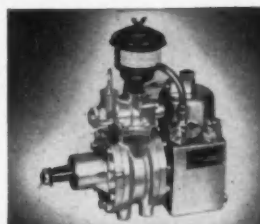
*provide safe,
sure stops for
cam type brakes!*



Wagner Straight-Air Brake actuating systems give cam type foundation brakes the ability to make quick, safe stops—completely controlled by the driver. They are furnished plenty of air at all times by the Wagner Rotary Air Compressor. The actuating units and application valves are *positive* in operation—performance improved on many thousands of installations.

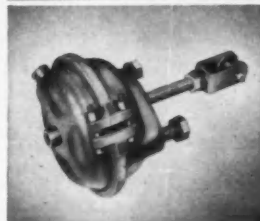
Wagner Air Brakes are the product of more than thirty years of brake engineering experience—gained in the designing and building of brake systems and brake parts for the automotive industry. When you equip the heavy-duty vehicles you manufacture with Wagner Air Brakes, you are adding safety and low-maintenance features that build customer acceptance.

Get all the facts on the Rotary Compressor and other features that make Wagner Straight-Air Systems so dependable and so safe. Write for your free copy of Catalog KU-201—it gives all the facts you should know about Wagner Air Brake Systems.



features include:

WAGNER ROTARY AIR COMPRESSOR—provides an abundance of air at all times. Its cool operation prevents carbon formation in air lines. Uniform torque load and smooth operation with moderate stresses assure long compressor life and long belt life.



WAGNER BRAKE CHAMBERS—have diaphragms of neoprene rubber bonded to high-tensile-strength nylon fabric for superior oil resistance and maximum strength and flexibility. Available with or without push-rod seal. All brake chamber parts are of corrosion-resistant material, or are plated to prevent rusting. Wagner Brake Chambers are interchangeable with all clamp type and bolt type units equipped with standard mounting studs, regardless of make.



WAGNER MOISTURE EJECTION VALVE—automatically keeps air reservoirs clean and dry by ejecting accumulated moisture with each average brake application—without causing a noticeable drop in tank pressure.

K57-11



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SANBORN CONSOLE RECORDING SYSTEMS

Up to eight problem variables can be recorded in inkless, permanent, rectangular-coordinate tracings—with Sanborn's improved six- and eight-channel 156-, 158-5490 Console Systems. Less than four feet high and about two feet in width and depth, these Systems are completely mobile and designed for maximum operating convenience. Controls and indicators on the sloping top panel include individual-channel attenuation, position, balance, sensitivity and stylus heat adjustments; switch for turning off B + of output amplifiers; chart drive motor switch (can also be remotely controlled); code marker and/or one-second interval timer stylus switch. The Recorder unit, either six or eight channels, features paper loading from the top, and nine precisely controlled speeds from 0.25 to 100 mm/sec. Four dual-channel DC Driver Amplifiers of current feedback design are housed below the Recorder, and are mounted on a chassis which may be withdrawn for inspection.

Electrical specifications of the Console Recording Systems include a basic sensitivity of either .01 volt/chart division (5490 types) or 0.1 volt/chart division (5495 types); linearity of 1%; drift less than 1/2 chart division/hour (5490), less than 1/20 chart division/hour (5495); flat frequency response to 20 cps, down 3 db at 60 cps for all amplitudes to 5 cm peak; either single-ended or push-pull input signals of 5 meg. impedance (each input lead to ground).

A useful companion instrument is the new Sanborn Model 183 Programmer, designed to provide a connecting link between an analog computer and the Console Recording System. Shown mounted at the top rear of the Console, the Programmer operates the Console in the following automatic sequence: turns recorder drive on—feeds calibration signals to all channels—reads initial DC levels of computer—closes contacts to start computer problem—records computer output for a preset chart length—turns off recorder drive and resets itself for another cycle.

Further technical data, prices and delivery information—on the 5490/5495 Console Recording Systems and two- to eight-channel 5475/5480 Systems are available on request from your Sanborn Sales-Engineering Representative or the Industrial Division in Waltham.



SANBORN COMPANY
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175 Wyman Street, Waltham 54, Massachusetts

YOLOY "E" IS ON THE JOB

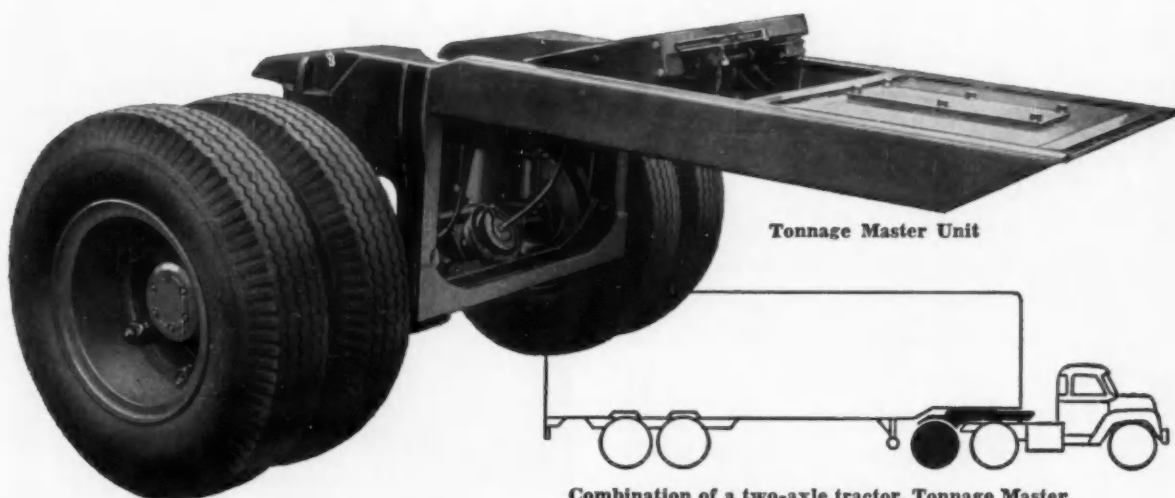
... providing increased strength,
corrosion and impact resistance for
Fruehauf's new "Tonnage Master"

This "extra axle" conversion assembly, built exclusively by Calumet Tonnage Master Fabricators, Inc., for the Fruehauf Trailer Company, enables truck operators to get maximum performance from their existing equipment.

Riding behind a two-axle tractor, a Tonnage Master provides increased load carrying capacity, reduction in tractor wheelbase, improved traction on curves, increased tire life as well as easier riding through utilization of more springs.

All components—except springs and axles—are fabricated from Youngstown's Yолоy "E" high strength-low alloy steel. This versatile steel was wisely specified to provide the units with longer life, increased resistance to shock, vibration and corrosion, as well as lighter—yet stronger—construction.

Youngstown's complete family of Yолоy steels is available in Sheets, Plates, Bars, Shapes, Cold Drawn Bars and Tubular Products. Complete informative Data Sheets on each Yолоy steel will be promptly sent upon request.



Combination of a two-axle tractor, Tonnage Master and a dual-axle trailer provides five axles for carrying top loads at greater safety.

Write for these free pamphlets in
The Yолоy Family series:

YOLOY "E"	High Strength Low Alloy Steel—standard applications
YOLOY	High Strength Low Alloy Steel—special applications
YOLOY "S"	Higher Strength Steel for increased service life
YOLOY "C"	Corrosion Resistant Grade for deep forming
YOLOY PIPE	Continuous Weld for corrosion resistant applications

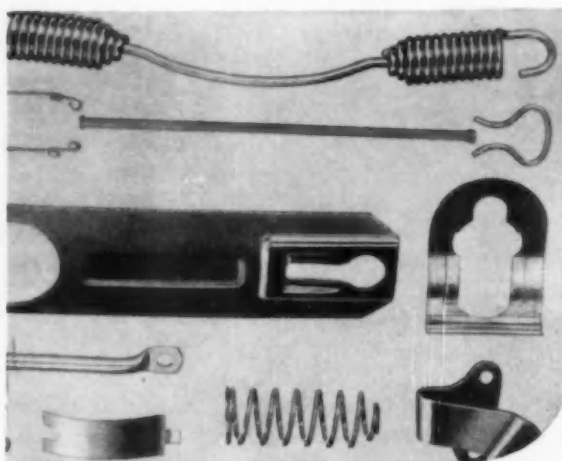


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ADJUSTMENT

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SWIVELS TO FOUR
90° POSITIONS



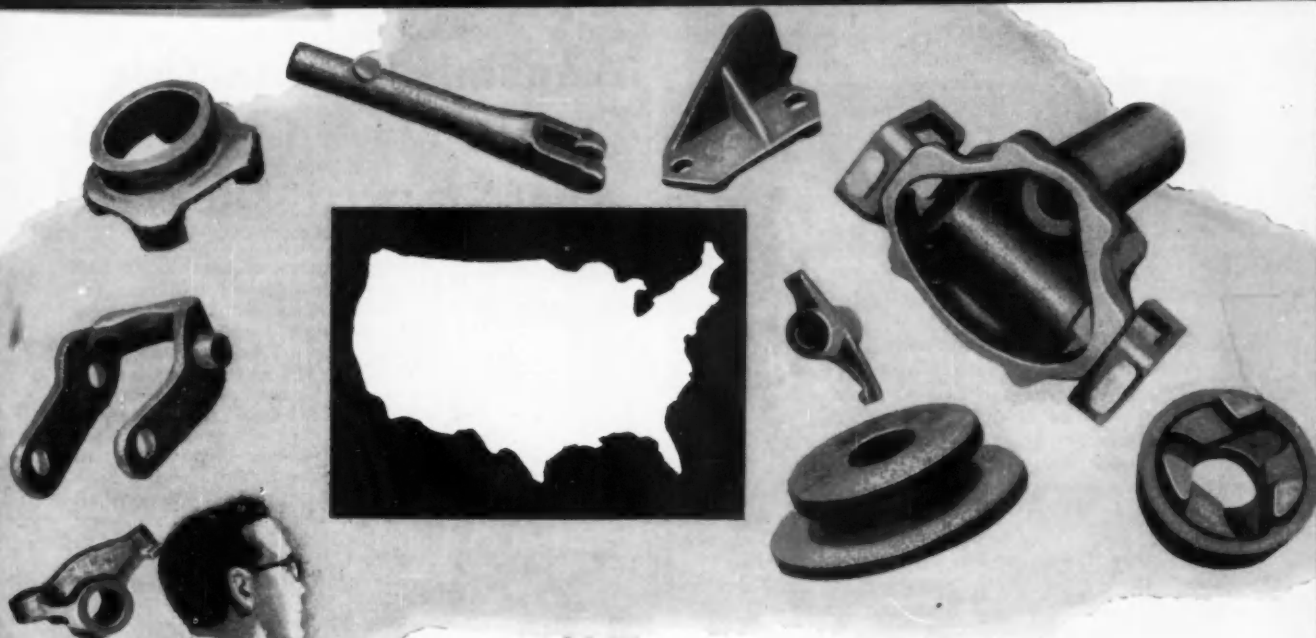
Operators like the Milsko patented "Lift-N-Tilt" feature of the "Sentry" seat. The spring-action lever allows for quick tilt adjustments. Complete with fore and aft adjustments also.

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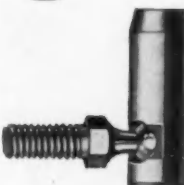


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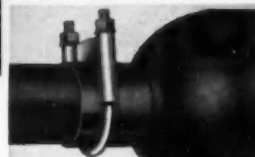
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Tightness**

This new, patented, precision-formed Clamp provides a positive 360° leak-proof seal of superior strength yet possessing sufficient flexibility to prevent "freezing" and possible joint breakage. Light weight; easy to assemble; improves exhaust system; gives long-lived service; re-usable.



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BEFORE RIVETING YOURSELF INTO A CORNER

check with Milford Engineers!

Riveting raises *special* problems and requires *special* skills. You must have the right type and size rivet for each application, or the results can be costly . . . in production and in profits. When you're faced with a riveting problem, let Milford engineers lend a hand before designs are fixed!

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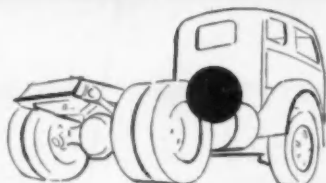
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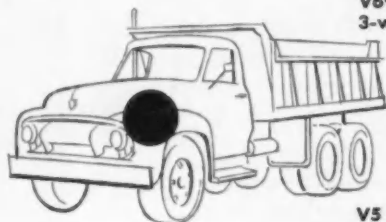


V69 Series
3-way



FOR SADDLE TANK OPERATION

On trucks equipped with saddle tanks, the Skinner V69 Solenoid Valve can make fuel level readings and tank switching a one-step, push-button operation.

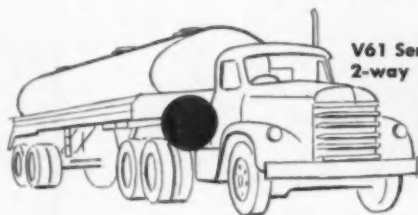


V5 Series
2-way



FOR DIESEL CUT-OFF

On diesel trucks, the Skinner V75 Solenoid Valve can be used to automatically shut the engine down by cutting off the fuel to the injectors.

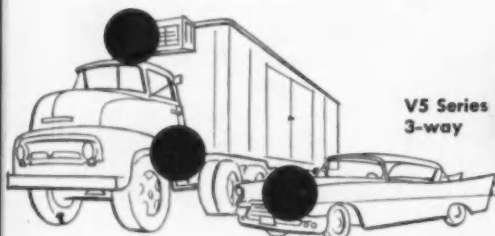


V61 Series
2-way



FOR PROPANE AND BUTANE CUT-OFF

On high pressure propane and butane trucks, the Skinner V61 Solenoid Valve can be used to automatically shut off the tanks from the fuel system when the vehicle is not in operation.

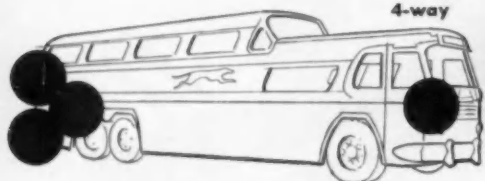


V5 Series
3-way

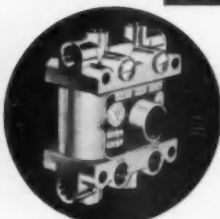


FOR AIR AND HYDRAULIC CONTROL

Skinner V5 Solenoid Valves are employed to control the operation of cylinders, diesel racks, clutches, brakes, governors, transmissions; also heating, refrigerating, fuel and air suspension systems.



V9 Series
4-way



FOR SWITCH CONTROL

Skinner V9 Solenoid Valves can be used with confidence in conjunction with centrifugal, thermal, ignition and limit switches to automatically perform such sequencing, interlocking and safety functions as door opening and closing, ventilation, air conditioning, etc.

Skinner Solenoid Valves can help you solve many different control problems

No matter what your control problem is, chances are a Skinner Solenoid Valve can solve it. "On-the-road" tests show these valves can take it under all conditions.

In addition to quality and simplicity of design, Skinner Solenoid Valves have features that assure long, uninterrupted operation of any system which uses them.

If your problem is fuel control, air conditioning, ventilation, door opening or closing, suspension, fuel

injection, etc., consider the use of Skinner Solenoid Valves — there are over 100,000 variations available, which means custom design from standard parts. Let our application engineering department show you how they can meet your specific requirements.

For complete information, write us at Dept. 330 or contact a Skinner Representative (they are listed in the Yellow Pages).

Skinner Solenoid Valves are distributed nationally



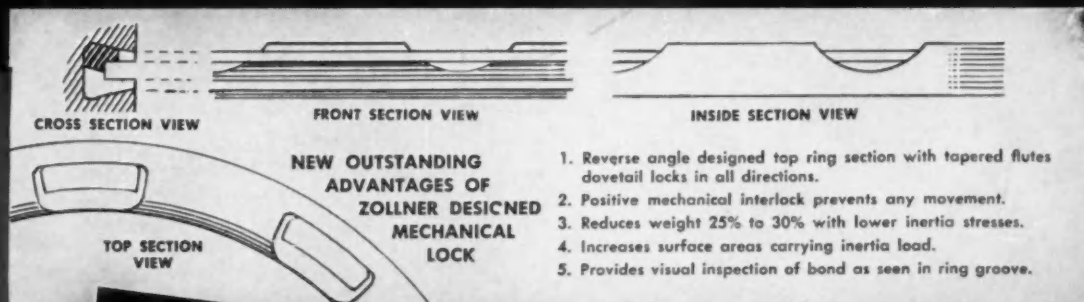
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SKINNER

**ELECTRIC VALVE
DIVISION** NEW BRITAIN
CONNECTICUT
105 EDGEWOOD AVENUE

BOND E LOC* PISTONS

WITH "NI-RESIST" IRON TOP RING SECTION



Double Bonded
METALLURGICALLY
Al-Fin Bond

MECHANICALLY
Zollner Lock

STOPS!

RING GROOVE WEAR IN HEAVY DUTY SERVICE

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







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From high-capacity mainshaft turbine bearings of special steels and finish, stabilized for high temperature operation, down to tiny precision instrument bearings of exquisite accuracy—look to New Departure as the source you can rely on. For New Departure has the experience, the equipment and the ability to produce the world's finest ball bearings.



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	7.0866	10.
	8.6614	12.
	2.3622	3.7
	4.3307	7.0
	4.7244	7.48
	4.9213	7.48
	5.1181	7.874
	5.5118	8.661
	5.9055	8.506
	6.2992	9.4488
	6.6929	10.6299
	.9843	2.0472
	1.3780	2.8346
	1.7717	3.3465
	1.9685	3.5433
	2.3622	4.3307
	2.5591	
	2.755	

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Precision instrument bearings in bore sizes from $\frac{3}{4}$ to $\frac{3}{8}$ inch. Send for catalog PIB.


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